IN THE CIRCUIT COURT FOR THE COUNTY OF ALBEMARLE

THE RECTOR AND VISITORS OF THE UNIVERSITY OF VIRGINIA,	)	
Petitioner,	)	
v.	)	**Case No. CL10000398-00**
KENNETH T. CUCCINELLI, II, ATTORNEY GENERAL OF VIRGINIA,	)	
Respondent.	)	

BRIEF IN OPPOSITION TO PETITION

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TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page

Cases:

Virginia Statutes:

Federal Statutes:

Comes now Kenneth T. Cuccinelli, II, in his capacity as Attorney General of Virginia, by counsel, and files this Brief in Opposition to the Petition.

STATEMENT OF THE CASE

Under the Virginia Fraud Against Taxpayers Act ("FATA"), Va. Code § 8.01-216.1, *et seq.*, the Attorney General of Virginia is empowered to investigate potential violations of FATA and, if after the initial investigation there is sufficient evidence to go forward, ultimately bring a civil action. Va. Code § 8.01-216.4. FATA itself defines an investigation as "any inquiry conducted . . . for the purpose of ascertaining **whether** any person is or has been engaged in any violation of this article." Va. Code § 8.01-216.2 (emphasis added).

The matter before the Court is an extremely narrow one, and therefore, the issues that are properly before the Court are similarly narrow. The present matter is not an action to recover damages under FATA. Rather, the matter before the Court deals with a pre-suit investigation by the Attorney General regarding **whether** there may have been a violation of FATA. At this stage, the Attorney General is only asking questions and conducting an inquiry that FATA empowers him to conduct. The differences between the two stages affect what is properly before the Court and substantially limits what the Court should consider.

As a consequence, while the University of Virginia ("University") repeatedly raises potential merit defenses to any subsequent civil fraud suit, these are premature. Issues regarding what the requested documents will reveal about what was submitted for payment, when the submissions were made, to whom the submissions for payment were made, what were the conditions imposed on the University in its role in the grant process and what others who have investigated other allegedly related questions have concluded could conceivably affect the decision to bring a civil fraud case or serve to support potential defenses. However,

none of these potential defenses serves as a bar under FATA to the Attorney General collecting information pursuant to the powers conferred upon him by Va. Code § 8.01-216.4.

Properly framed under the present procedural posture, the questions before the Court are two. First, does the Attorney General have reason to believe that the University has "documentary material or information relevant to" his "false claims law investigation?" Va. Code § 8.01-216.10(A). Second, based on the Petition, has the University demonstrated "any failure of the demand to comply to with the provisions of [FATA] or . . . any constitutional or other legal right or privilege" belonging to the University? 8.01-216.18(C). The answer to the first question is "yes"; the answer to the second question is "no." Accordingly, the Court should deny the Petition and order the University to comply with the CIDs.

STATEMENT OF FACTS

Michael E. Mann ("Mann") obtained his Ph.D from the Department of Geology and Geophysics of Yale University in 1998. He was the lead author of a paper entitled "Global-scale Temperature Patterns and Climate Forcing over the Past Six Centuries" published in *Nature*, April 23, 1998. (hereinafter "MBH98"). He was also the lead author of "Northern Hemisphere Temperatures During the Past Millennium: Inferences, Uncertainties, and Limitations," *Geophysical Research Letters*, Vol. 26, No. 6, Pages 759-762, March 15, 1999. (hereinafter "MBH99"). Thereafter, between 1999-2005, he was an Assistant Professor in the Department of Environmental Sciences of the University of Virginia, where he obtained funding related to the grants that are the subject of the CIDs. Ex. A.

MBH98 and MBH99 gave rise to the now notorious "hockey stick" graph which purported to show a slight cooling trend from 1000AD onward, with temperature rising sharply in the twentieth century. Two points should be noticed. First, this conclusion was

contrary to what had been previously regarded as the known historical record: a Medieval Warm Period, followed by the Little Ice Age, followed by warming after 1850. In the twentieth century, there had been warming from the 1920s through the 1930s, cooling between the 1940s and 1970s, followed by a warming trend through 1998. Not only did MBH98 and MBH99 purport to show warming in the twentieth century that was unprecedented, with the hockey stick graph, the Medieval Warm Period and Little Ice Age disappeared.

The second thing to be noticed is that MBH98 and MBH99 were freighted with enormous public policy implications and appeared at a time when climate science was subject to unique political pressures and influences. Although theories of Green House Warming were discussed in the nineteenth century, *see* Arrhenius, "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground," *Philosophical Magazine and Journal of Science*, Series 5, volume 41, April 1896, pages 237-276, the issue did not achieve significant public policy salience prior to the creation of the Intergovernmental Panel on Climate Change (IPCC) in November 1988. The mission of the IPCC is to assess the science regarding the existence of man-made global warming, to assess the effects, dangers and consequences of man-made global warming, and to assess policy responses to it. Because the IPCC is not a scientific body itself, climate scientists, funded mostly by governmental grants, have provided scientific input and have written the periodic assessment reports. Those climate scientists who control the final product are few in number. Hulme & Mahony, "Climate Change: what do we know about the IPCC?," Review Article For *Progress in Physical Geography*, at 10-11 (12 April 2010) ("Claims such as '2,500 of the world's leading scientists have reached a consensus that human activities are having a significant influence on the climate' are

disingenuous. That particular consensus judgment, as are many others in the IPCC reports, is reached by only a few dozen experts in the specific field of detection and attribution studies; other IPCC authors are experts in other fields"). Ex. B. Not only are they few in number, but through connections with Mann, they formed a mutually supporting and reinforcing group; peer reviewing and co-authoring each other's papers. Wegman, Scott, & Said, "Ad Hoc Committee Report on the 'Hockey Stick' Global Climate Reconstruction" at 41-45 (2006) (Commissioned by the Chairman of the Committee on Energy and Commerce and the Chairman of the Subcommittee on Oversight and Investigations, hereinafter "Wegman Report"). Because neither the IPCC nor governmental grants to climate scientists would likely continue were it to be determined that man-made global warming was not a serious threat, potential conflicts of interest flow predominantly in one direction.

The public policy significance of the hockey stick lies in its potential to counter the argument that the world should not accept the massive costs of mitigation of CO_2 if the temperature is presently within the normal range of fluctuation as measured by the extremes of the Medieval Warm Period and the Little Ice Age. Presented with the hockey stick, the IPCC ran with it vigorously, giving it central billing in the 2001 "Third Assessment Report." Under the influence of the Third Assessment, nations made energy policy decisions that will increase costs for years to come inasmuch as all alternative renewable energy sources are prohibitively expensive without governmental subsidies of the type that have proved unsustainable in Denmark and Spain.

For a time the hockey stick carried all before it, perhaps because it seemed to correlate well with the observed increase in atmospheric carbon dioxide in the twentieth century over its 10,000 year baseline. Still, Mann's papers were soon criticized as outliers. *See* Soon &

Baliunas, "Proxy climatic and environmental changes of the past 1000 years," *Climate Research*, Vol. 23, pages 89-110 (2003) (an analysis of 140 proxy studies of climate history "establishes both the Little Ice Age and Medieval Warm Period as climatic anomalies with worldwide imprints" and "reveal that the 20th Century is probably not the warmest nor a uniquely extreme climatic period of the last millennium.") (Abstract). More explosively, Stephen McIntire and Ross McKitrick published "Corrections to the Mann et al. (1998) Proxy Data Base and Northern Hemispheric Average Temperature Series," *Energy & Environment*, Vol. 14, number 6 (November 2003), concluding that the hockey stick "is primarily an artifact of poor data handling, obsolete data and incorrect calculation of principal components." (Abstract). Further information provided by Mann revealed the existence of an algorithm that sought out any hockey stick pattern in any data and imposed it upon the data set as a whole. McKitrick, "What is the 'Hockey Stick' About," APEC Study Group, Australia April 4, 2003, at 10. The algorithm is so strong that it depicts random noise as a hockey stick 99% of the time. *Id.* The hockey stick in Mann's work had been generated and imposed on the data set by some Bristlecone Pine tree ring chronologies published by Graybill and Idso in 1993. "They all turned out to exhibit a 20th century growth spurt that has not been fully explained, but is likely to be at least in part due to CO_2 fertilization and is known not to be a temperature signal since it does not match nearby temperature records." *Id.* at 11. Indeed, "[t]he original authors . . . have stressed that they are not proper climate proxies." *Id.* Not only did the algorithm use the Bristlecone Pine Series to corrupt the data set but McKitrick concluded that Mann

> did this very experiment himself and discovered that the [principal components] lose their hockey stick shape when the Graybill-Idso series are removed. In so doing he discovered that the hockey stick is not a global

> pattern, it is driven by a flawed group of U.S. proxies that experts do not consider as climate indicators.

Id. at 12. According to McKitrick, after Mann performed the operation he stored it in a folder called CENSORED. *Id.*

The authors of MBH98 corrected some errors in a short corrigendum in 2004 in *Nature*, while denying that "these errors affect our previously published results." *Nature*, 430, 105. Subsequent exchanges between Mann et al. and McIntyre & McKitrick are collected and analyzed in the Wegman Report. *Compare* McIntyre & McKitrick, "The M&M critique of MBH98 Northern hemisphere climate index: Update and implications," *Energy and Environment*, 16 (1), 69-100 (2005) and McIntyre & McKitrick, "Hockey Sticks, principal components, and spurious significance," *Geophysical Research Letters*, 32, L03710, doi: 10. 1029/2004 GL 021750 (2005), with Mann, Rutherford, Wahl & Ammann, "Testing the Fidelity of Methods used in proxy-based reconstructions of past climate," *Journal of Climate*, 18, 4097-4107 (2005), and Rutherford, Mann, Osborn, Bradley, Briffa, Hughes & Jones, "Proxy-based Northern Hemisphere surface reconstructions: sensitivity to method, predictor network, target season, and target domain," *Journal of Climate*, 18, 2308-2329 (2005).

The Wegman Report found the McIntyre and McKitrick papers "to be valid and their arguments to be compelling." Wegman Report at 48. Its analysis of MBH98 led to other conclusions as well: the data relied on in published articles can be "poorly documented and archived" and insufficiently "robust to withstand intense public debate," with publication too dependent "on peer review, which seem[s] not to be sufficiently independent," while some authors tend to be grudging and haphazard in sharing data, and unwilling to "interact[ ] with the mainstream statistical community." *Id.* at 51. The Wegman Report concluded that the use

of proxy climate data is "still in its infancy," incapable at this time of reaching "definitive conclusions." *Id.* at 27. The Wegman Report left open the question of whether or not "Mann and associates realized the error of their methodology at the time of publication." *Id.* at 4.

In addition to proxy data, Mann employed land temperature data. The first data base established for such information was maintained by the Climate Research Unit ("CRU") at the University of East Anglia ("UEA"). The scientists of the CRU have been central players in the IPCC process and historically have been closely associated with Mann. In late 2009, certain e-mails and code files from the CRU were posted on the internet, having been hacked or leaked. Dubbed "Climate Gate" by the press, the e-mails generated charges that the CRU was operated by a small clique of scientists who viewed their mission to include attempts to silence critics in a way that made the practice of science adversarial and biased. Those e-mails include notable ones from Mann.

In writing about the Chief Editor of the Journal of Geophysical Research, Mann said,

> It seems clear we have to go above him. I think that the community should, as Mike Hulme has previously suggested in this eventuality, terminate its involvement with this journal at all levels – reviewing, editing, and submitting, and leave it to wither way[sic] into oblivion and disrepute.

On October 26, 2003, Mann wrote:

> This has been passed along to me by someone whose identity will remain in confidence. Who knows what trickery has been pulled or selective use of data made. It's clear that "Energy and Environment" is being run by the baddies -- only a shill for industry would have republished the original Soon and Baliunas paper as submitted to "Climate Research" without even editing it. Now apparently they're at it again. . .
>
> My suggested response is: 1) to dismiss this as stunt, appearing in a so-called "journal" which is already known to have defied standard practices of peer-review. It is clear, for example, that nobody we know has been asked to "review" this so-called paper 2) to point out the claim is nonsense since the same basic result has been obtained by numerous other researchers, using different data, elementary compositing techniques, etc. Who knows what

sleight of hand the authors of this thing have pulled. Of course, the usual suspects are going to try to peddle this crap. The important thing is to deny that this has any intellectual credibility whatsoever and, if contacted by any media, to dismiss this for the stunt that it is.

Thanks for your help,
mike

On September 30, 2009, Mann wrote to Phil Jones,

Hi Phil, lets not get into the topic of hate mail. I promise you I could fill your inbox w/ a very long list of vitriolic attacks, diatribes, and threats I've received. Its part of the attack of the corporate-funded attack machine, i.e. it's a direct and highly Intended outcome of a highly orchestrated, heavily-funded corporate attack campaign. We saw it over the summer w/ the health insurance industry trying to defeat Obama's health plan, we'll see it now as the U.S. Senate moves on to focus on the cap & trade bill that passed congress this summer. It isn't coincidental that the original McIntyre and McKitrick E&E paper w/ press release came out the day before the U.S. senate was considering the McCain Lieberman climate bill in '05. we're doing the best we can to expose this. I hope our Realclimate post goes some ways to exposing the campaign and pre-emptively deal w/ the continued onslaught we can expect over the next month. thanks for alerting us to that detail of Kaufman et al which I'd overlooked.

Notoriously, although Mann did not write it, he was a recipient of an e-mail from Phil Jones of the CRU in which Jones wrote of Mike's trick to hide the decline.

Dear Ray, Mike and Malcolm,

Once Tim's got a diagram here we'll send that either later today or first thing tomorrow. I've just completed Mike's Nature trick of adding in the real temps to each series for the last 20 years (ie from 1981 onwards) and from 1961 for Keith's to hide the decline. Mike's series got the annual land and marine values while the other two got April-Sept for NH land N of 20N. The latter two are real for 1999, while the estimate for 1999 for NH combined is +0.44C wrt 61-90. The Global estimate for 1999 with data through Oct is +0.35C cf. 0.57 for 1998. Thanks for the comments, Ray

In response to Climate Gate, several investigations were commenced, some of which have been concluded. The House of Commons Science and Technology Committee published a report entitled "The disclosure of climate data from the Climatic Research Unit at

the University of East Anglia" on March 31, 2010. The committee specifically declined to review the scientific validity of the CRU work, and MBH98 and MBH99 were not evaluated either. *Id.* at 4, 46. A nine page "Report of the International Panel set up by the University of East Anglia to examine the research of the Climatic Research Unit" was issued on April 12, 2010. Although the report found eleven articles produced by the CRU did not represent scientific impropriety, none were written by Mann, who has never been formally affiliated with the CRU. The report also stated, "We cannot help remarking that it is very surprising that research in an area that depends so heavily on statistical methods has not been carried out in close collaboration with professional statisticians." *Id.* at 5.

On June 4, 2010, a report was issued by the Pennsylvania State University entitled "RA-10 Final Investigation Report involving Dr. Michael E. Mann." The committee accepted Mann's explanation that the "trick" to hide the decline was nothing more than easily misunderstood benign scientific jargon. *Id.* at 9. The committee, based in part upon his success in obtaining grants and in publishing a large number of papers, concluded "that Dr. Michael E. Mann did not engage in, nor did he participate in, directly or indirectly, any actions that seriously deviated from accepted practices within the academic community for proposing, conducting, or reporting research, or other scholarly activities." *Id.* at 17-19.

Most recently a UEA committee chaired by Sir Muir Russell issued a report entitled "The Independent Climate Change E-mails Review, July 2010." At 1.3.2 (23) of the Executive Summary, the following appears:

> On the allegation that the references in a specific e-mail to a 'trick' and to 'hide the decline' in respect of a 1999 WMO Report figure show evidence of intent to paint a misleading picture, we find that, given its subsequent iconic significance (not least the use of a similar figure in the IPCC Third Assessment Report), the figure supplied for the WMO Report was misleading.

Id. at 13. *See also id.* at 60. The conclusion to be drawn from this, at the very least, is that Mann devised a method of splicing data which could be misleading, was told that it was being used in a manner now found by UEA to be misleading, and said nothing about it.

It should also be noticed that Climate Gate has produced an apparent recognition at UEA that the interaction between science and the IPCC has the potential to corrupt science while misleading both the public and their leaders through the systemic suppression of the extent of uncertainty in the science. The committee found "a consistent pattern of failing to display the proper degree of openness, both on the part of the CRU scientists and on the part of the UEA," *Id.* at 11, "that e-mails might have been deleted in order to make them unavailable should a subsequent request be made for them," *Id.* at 14, and that peer review "should not be overrated as a guarantee of the validity of individual pieces of research." *Id.* at 15. *See also id.* at 64 ("Peer review is not a 'gold standard' that ensures validity, as some claim."). With respect to the communication of scientific uncertainty, the committee wrote:

> Climate Science is an area that exemplifies the importance of ensuring that policy makers . . . understand the limits on what scientists can say and with what degree of confidence. Statistical and other techniques for explaining uncertainty have developed greatly in recent years, and it is essential that they are properly deployed. But equally important is the need for alternative viewpoints to be recognized in policy presentations, with a robust assessment of their validity, and for the challenges to be rooted in science rather than rhetoric.

Id. at 14-15. The committee ended its Executive Summary by "welcom[ing] the IPCC's decision to review its processes, . . . stress[ing] the importance of capturing the range of viewpoints and reflecting appropriately the statistical uncertainties surrounding the data it assesses." *Id.* at 16. No review of the CRU science as a whole was undertaken and no view on that subject was expressed. *Id.* at 23, 36.

A final contextual matter should be discussed, which may elucidate the report's contrast between "science" and "rhetoric." Mike Hulme and Martin Mahony of the UEA, raise the question whether "the IPCC is an example of how the philosophy of post-normal science is reflected in practice." "Climate Change: what do we know about the IPCC?" at 9 (citing Funtowicz & Ravetz, 1993). The inventors of Post Normal Science have described it in this fashion:

> In the sorts of issue-driven science relating to the protection of health and the environment, typically facts are uncertain, values in dispute, stakes high, and decisions urgent. The traditional distinction between 'hard', objective scientific facts and 'soft', subjective value-judgments is now inverted. All too often, we must make hard policy decisions where our only scientific inputs are irremediably soft. The requirement for the "sound science" that is frequently invoked as necessary for rational policy decisions may affectively conceal value-loadings that determine research conclusions and policy recommendations. In these new circumstances, invoking 'truth' as the goal of science is a distraction, or even a diversion from real tasks. A more relevant and robust guiding principle is quality, understood as a contextual property of scientific information.

Funtowicz & Ravetz, "Post Normal Science," page 1-2.

http://www.ecoeco.org/pdf/pstnormsc.pdf . Scientific quality under this theory is achieved through consensus in a peer community. *Id.* at 7, 9-11. Paradoxically, if a practitioner of Post Normal Science claims consensus, he thereby admits that he is operating in an environment of objective uncertainty.

Mike Hulme, a lead author for the IPCC Third Assesment Report, believes that Climate Science is and should be Post Normal. Writing in *The Guardian* newspaper on Wednesday, March 14, 2007, he expressed the following opinions:

> Climate change is happening, but it appears that science is split on what to do about it. One of the central reasons why there is disagreement about how to tackle climate change is because we have different conceptions of what science is, and with what authority it speaks – in other words, how scientific

"knowledge" interacts with those other realms of understanding brought to us by politics, ethics and spirituality.

. . . .

At one level, it is as simple as this. Science as a means of inquiry into how the world works has been so successful because it has developed a series of principles, methods and techniques for being able to make such judgments.

. . . .

The other important characteristic of scientific knowledge – its openness to change as it rubs up against society – is rather harder to handle. Philosophers and practitioners of science have identified this particular mode of scientific activity as one that occurs where the stakes are high, uncertainties large and decisions urgent, and where values are embedded in the way science is done and spoken.

It has been labeled "post-normal" science. Climate change seems to fall in this category. Disputes in post-normal science focus as often on the process of science – who gets funded, who evaluates quality, who has the ear of policy – as on the facts of science.

. . . .

. . . Too often with climate change, genuine and necessary debates about these wider social values – do we have confidence in technology; do we believe in collective action over private enterprise; do we believe we carry obligations to people invisible to us in geography and time? – masquerade as disputes about scientific truth and error.

The danger of a "normal" reading of science is that it assumes science can first find truth, then speak truth to power, and that truth-based policy will then follow. . . .

If only climate change were such a phenomenon and if only science held such an ascendancy over our personal, social and political life and decisions. In fact, in order to make progress about how we manage climate change we have to take science off centre stage.

. . . .

What matters about climate change is not whether we can predict the future with some desired level of certainty and accuracy; it is whether we have sufficient foresight, supported by wisdom, to allow our perspective about the future, and our responsibility for it, to be altered. All of us alive today have a stake in the future, and so we should all play a role in generating sufficient, inclusive and imposing knowledge about the future. **Climate change is too important to be left to scientists – least of all the normal ones.**

http://www.guardian.co.uk/society/2007/mar/14/scienceofclimatechange.climatechange

(emphasis added). Ex. C.

Mann's reference to "the community" when writing to Hulme in the first e-mail quoted above appears to be Post Normal jargon. As recently as September 16, 2009, Mann posted this remark to his blog *RealClimate*: "More than anything else, the book attempts to show us what the **community** is doing wrong in our efforts to communicate our science to the public." (emphasis added). This is also probably Post Normal jargon.

Academics are free to follow any philosophy of science they wish. Nonetheless, Post Normal Science has produced jargon which might be misleading/fraudulent in the context of a grant application if its specialized meaning is not disclosed or otherwise known to the grant maker.

In light of all the charges previously made by others, and the contextual information known from the public domain, there is sufficient reason to review the requested information and to ask obvious questions such as these: (1) Does the University have documents bearing on the possibility that Professor Mann used MBH98 and MBH99 or other data to support grant applications knowing them to be misleading?, and (2) Did he use language on any grant application or claim for payment that was misleading because of undisclosed or otherwise unknown special meaning?

Interest in the controversies surrounding Mann led others to make FOIA requests of the University regarding Mann's work. As early as December 2009, at least one request was made to view some of Mann's e-mails that were believed to be held by the University. The University, through its President, John Casteen, and its FOIA Compliance Officer, Carol Wood, responded that the University would conduct a vigilant search for the e-mails. Ex. D (Text copy of e-mails between Del. Marshall and the University). Ultimately, the University, without suggesting in any way that the e-mails were not subject to FOIA, indicated that

> [t]he University does not have any e-mail data for Mr. Mann. When Mr. Mann moved to Penn State his U.Va. account was terminated and all data was later deleted. E-mail data from terminated accounts are routinely deleted after we are assured of a smooth transition to a new institution.
>
> Please know that we had engineers in our department of information technology double-check the status of Mr. Mann's e-mail account.

Id. (E-mail from Wood to Marshall). Given modern realities regarding data retention, computers and e-mail servers, the University's response necessarily strained credulity.

The Office of the Attorney General ("OAG") served CIDs on the appropriate University officials at the end of April. Shortly after service, the University's then counsel contacted OAG and made several requests. First, the University asked that it be granted an extension to produce responsive documents until mid-summer. In the discussion regarding an extension, OAG asked if, given the prior FOIA response, OAG could reasonably expect any responsive e-mails to be found. The University's then counsel indicated that an e-mail server with potentially responsive documents that had not been searched in response to the FOIA request had been located and secured. Based, in part, on that representation, the extension was granted.

In addition to the extension, the University's then counsel also raised the issue of the breadth of the CIDs and asked if OAG would limit the scope of the search by identifying specific departments. It was explained that the University does not have one centralized e-mail server, but rather, has a combination of centralized servers and departmental servers. As a result, OAG limited the scope of the search in the manner described in a May 6, 2010 letter to the University's counsel. Ex. E. OAG concluded the letter, stating "if any other issues arise during the collection of the . . . information/documents, please contact [OAG] to discuss potential resolution of the issues." *Id.*

Shortly thereafter, the University changed counsel and filed its Petition.[1] One of the primary arguments raised in the Petition was that the grants referenced in the Petition could not be the subject of FATA because there was federal involvement in four of the grants and the fifth was initially awarded before FATA's effective date.[2] After the Petition was filed, the University's new counsel and OAG had discussions regarding how the matter should proceed. In such discussions, OAG noted that, if the grant and payment documents requested showed no claims for payment made on the University and no payments made by the University related to the grants after January 1, 2003, that might obviate the need for the remainder of the investigation. Accordingly, OAG asked the University to produce those documents (grant information and payment information) that the University contended would show that FATA was not implicated. The University's counsel indicated he would have to discuss that with his client; no response to the request has been received as of the filing of this brief.

Given the foregoing, it is clear that there is ample reason to believe that Mann may have committed a violation of FATA while he was at the University. There is no debate that the University is in possession of documents relevant to determining if such a violation did occur. Accordingly, and for the reasons that follow, the Court should deny the University's Petition and order it to comply with the CIDs.

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[1] The University was originally represented by Barry Meek, its Associate General Counsel and an Assistant Attorney General.

[2] Importantly, the University has never expressly denied that payments under the grants were made by the University after January 1, 2003. That is all that would be necessary to subject the grants to FATA.

ARGUMENT

A. The Attorney General has reason to believe that the University has documentary material or information relevant to his FATA investigation.

On page 12 of its Brief, the University misstates the relevant standard for the Attorney General to issue a CID, arguing that a CID should issue only if the Attorney General has "an objective 'reason to believe' that the recipient . . . has information relevant to a potential FATA violation." This misstates the statutory standard. Stated accurately, the standard is that the Attorney General may issue a CID whenever he "has reason to believe that any person may be in possession, custody, or control of any documentary material or information relevant to a false claims law **investigation**." Va. Code § 8.01-216.10 (emphasis added). The distinction between relevant to an investigation as opposed to relevant to a violation is significant.

In the instant case, no one disputes that there is currently pending a FATA investigation regarding Mann and the grants that he has identified in his C.V. as having some connection with the University. Further, it is plain that the information sought (the materials submitted in an effort to obtain the grants initially, the materials submitted to obtain payment under the grants as work progressed, the research upon which the grant materials were based, the payments made under the grants, who made the payments under the grants, and communications to and from Mann related to his knowledge of whether his submissions were accurate or not) is calculated to shed light on whether a FATA violation has occurred. Because there is no dispute that the University is in possession of the requested materials and information, the Attorney General clearly has reason to believe the University "may be in possession, custody, or control of any documentary material or information relevant to a false claims law investigation." Accordingly, the statutory standard has been satisfied.

The University's misstatement of the standard, substituting relevant to a "violation" as opposed to relevant to an "investigation," is simply without basis in Virginia law. In dealing with the analogous standard in the civil investigative order provisions of the Virginia Consumer Protection Act, the Virginia Supreme Court found that the

> "reasonable cause" standard requires less than the probable cause standard and does not require a showing that a violation has in fact occurred. As stated by the Commonwealth, "at this point in the investigation it is not necessary for the Commonwealth to prove that any customer has actually been deceived; that is to be established at trial. . . ."

Paramount Builders, Inc. v. Commonwealth, 260 Va. 22, 28, 530 S.E.2d 142, 144 (2000). *See also In re American Dollar*, 27 Va. Cir. 428, 428-29 (Campbell Co. Cir. Ct. 1992) (holding that "reasonable cause" standard under Virginia Consumer Protection Act "is a lower standard than probable cause. **'Reasonable cause' does not require an actual belief that violations of the Act have in fact occurred.")** (emphasis added).

The reason that FATA and similar statutes do not require even "an actual belief" that a particular act has been violated is that such a requirement would be placing the cart before the horse. The whole point of pre-suit investigations is to determine "**whether** any person is or has been engaged in any violation of" FATA. Va. Code § 8.01-216.2 (emphasis added). The investigation may exonerate the target of the investigation, implicate him, or reveal insufficient information to draw a conclusion. The standard for the issuance of CIDs for FATA is necessarily low to allow the taxpayers' interest to be protected without forcing the Attorney General to bring enforcement actions without first reviewing all of the facts.

Vesting such investigatory discretion in an executive branch official or agency is not at all unusual.[3] The University concedes that the federal False Claims Act (including the law of administrative subpoenas) is an appropriate analogue for reviewing CIDs under FATA. University's Brief, p.10, n. 8. As with FATA, CID power is given to the Attorney General under the federal statute. 31 U.S.C. § 3733. In determining whether the U.S. Attorney General has properly issued a CID under the False Claims Act, "the court's review . . . is extremely limited." *United States v. Witmer*, 835 F. Supp. 208, 220 (M.D. PA 1993), *citing*, *United States v. Morton Salt Co.*, 338 U.S. 632 (1950). In *Morton Salt*, the United States Supreme Court made clear that when, as with the Attorney General here, an executive official or agency is given the power to both investigate and prosecute violations of the law, the executive's investigative activities are not limited by the rules that courts normally impose on parties in litigation. Specifically, the Court held that

> **The only power that is involved here is the power to get information from those who best can give it** . . . . Because judicial power is reluctant if not unable to summon evidence until it is shown to be relevant to issues in litigation, it does not follow that an administrative agency charged with seeing that the laws are enforced may not have and exercise powers of original inquiry. **It has a power . . . which is not derived from the judicial function. It is more analogous to the Grand Jury, which does not depend on a case or controversy for power to get evidence but can investigate merely on suspicion that the law is being violated, or even just because it wants assurance that it is not.** When investigative and accusatory duties are delegated by statute to an administrative body, it, too, may take steps to inform itself as to whether there is probable violation of the law.

[3] FATA grants to the Attorney General a great deal of discretion as to what is sufficient to warrant the initial investigation. However, the General Assembly chose to grant the Attorney General that power when it unanimously adopted FATA in 2002. Ex. F. In turn, the people of Virginia gave this power to the Attorney General when they elected him in 2009.

Morton Salt, 338 U.S. at 642-43 (emphasis added). Thus, even if all the Attorney General were seeking in this matter is the "assurance" that FATA has not been violated, the issuance of the CIDs in this matter would be a proper exercise of his statutory authority.

In its brief, the University is unable to cite to any Virginia authority to support its position that FATA requires the Attorney General to have "an objective 'reason to believe' that the recipient . . . has information relevant to a potential FATA violation. . . ." before issuing a CID. Rather, the University relies on cases from other jurisdictions whose statutory schemes do not track Virginia's. These cases are inapposite and, to the extent that they are at all relevant to the issue here, do not support the University's position.

First, the University cites the decision of the Florida Court of Appeals in *Check' N Go of Florida, Inc. v. Florida*, 790 So.2d 454 (Fla. App. Ct. 2001). In that case, the issue was whether the Attorney General of Florida had the statutory authority to issue an investigative subpoena under the Florida RICO Act. *Id.* at 457. Under the statute at issue, the Florida Attorney General is only authorized to issue such a subpoena if he "'has reason to believe that a person or other enterprise has engaged in, or is engaging in, activity in violation of [the Florida RICO Act] . . . .'" *Id.* Thus, unlike the CID provision of FATA, the Florida statute at issue actually required the Florida Attorney General to believe that the RICO Act had been violated. As discussed above, Virginia courts have already rejected the notion that reason to believe in the civil investigation context in Virginia requires a belief that the underlying act has been violated. *See, e.g., Paramount Builders*, 260 Va. at 28; *In re American Dollar*, 27 Va. Cir. at 428-29.

Furthermore, the Florida court recognized that the standard for issuing a civil subpoena, even under Florida's more restrictive statute, was low. The Court held that

> [b]ecause the purpose of an administrative investigation is to discover and procure evidence, and not to prove a pending charge or complaint, its function is distinct from an adjudication, and, accordingly, more latitude is allowed in considering the foundation for the subpoena. An investigation, in short, does not determine guilt or innocence.

Check' N Go, 790 So.2d at 458.

Finally, even when the Florida court applied Florida's more stringent standard, it engaged in a line of reasoning which suggests how Virginia's lower standard should be applied:

> [w]e conclude, therefore, that the test to be applied in determining whether the Attorney General is authorized to issue an investigatory subpoena under section 895.06(2), is whether under the circumstances a reasonably prudent person would be warranted in the belief that a person or other enterprise who is the subject of the subpoena has engaged in, or is engaging in, activity in violation of the Florida RICO Act.

Id. Applying the same logical chain to the language of the Virginia statute would result in the following conclusion (language of the Virginia statute in bold):

> [w]e conclude, therefore, that the test to be applied in determining whether the Attorney General is authorized to issue [a CID under Va. Code § 8.01-216.10] is whether under the circumstances a reasonably prudent person would be warranted in the belief that [the University] **may be in possession, custody, or control of any documentary material or information relevant to a false claims law investigation.**

The Attorney General meets this standard.

Similarly, the University's reliance on the decision of the Utah Supreme Court in *Evans v. Utah*, 963 P.2d 177 (Utah 1998), does not advance its position. Under the Utah statute at issue in *Evans*, the Attorney General of Utah, like the Attorney General in the instant case, was authorized "to issue CIDs 'when the attorney general has reasonable cause to believe that any person may be in possession, custody or control of any information relevant to a civil antitrust investigation.'" *Id.* at 180 (citation omitted). However, unlike FATA, the

Utah statute explicitly changed the standard of review when a person or entity challenged a CID in court, with "the attorney general [having] the burden of establishing 'that the demand is proper, that there is reasonable cause to believe that there has been a violation of this act, and that the information sought or document or object demanded is relevant to the violation.' *Id.* § 76-10-917(7)(b)(ii)." *Id.* Because Virginia has no such "stepped-up" standard when a CID is challenged, *Evans* is inapposite, and this Court should apply the standard found in FATA-- a CID is proper so long as the Attorney General "has reason to believe that any person may be in possession, custody, or control of any documentary material or information relevant to a false claims law investigation." The Attorney General meets this standard.

Ironically, the various investigations of Mann and other climate scientists cited by the University in its brief (University Brief, p. 3-4) and various other similar investigations simply augment the already sufficient evidence to warrant an investigation. Is it truly the University's position that none of those investigations were warranted and all of the groups cited acted without any reasonable basis in fact? If not, the very existence of those investigations reinforces the conclusion that there is sufficient basis for the Attorney General to have issued the CIDs in the instant case.

That some of the investigations cited have been completed and have allegedly "cleared" Mann does not alter the analysis. *See, e.g., United States v. University of Pittsburgh*, 192 F.3d 402, 405 (3rd Cir. 1999) (action under federal False Claims Act for allegedly making false claims to NIH under federal research grants allowed to proceed despite investigations conducted by both the University of Pittsburgh and NIH determining that no material misconduct had occurred). Furthermore, other than the investigation being conducted by the Attorney General, no one has investigated whether or not Mann's conduct violated

FATA. To the best of the Attorney General's knowledge, no other investigation has collected the data sought regarding the grants themselves, the payments made under the grants, the submissions made to support and comply with the grants, and Mann's communications with others regarding his thoughts/understanding of the issues involved. Simply put, the other investigations confirm that there is substantial reason to inquire, but none can "clear" Mann of violating FATA because no one, other than the Attorney General, has asked that question.

B. The CIDs issued in this matter comply with the provisions of FATA.

A recipient of a CID may challenge the CID for failing to "comply with the provisions of" FATA. Va. Code § 8.01-216.18(C). In its Petition and supporting Brief, the University argues that, for various reasons, the CIDs fail to comply with the provisions of FATA. A review of each of these arguments demonstrates that the CIDs comply with the provisions of FATA, and therefore, the Court should order the University to comply with the CIDs.

In construing the provisions of FATA, the Court should consider the overarching purpose of FATA. Like the federal False Claims Act, the overriding purpose of FATA is to protect the public purse, and therefore, must be broadly construed to reach virtually any attempt to use a false statement to obtain government payment. *United States v. Neifert-White Co.*, 390 U.S. 228, 233 (1968) (the False Claims Act "reaches beyond 'claims' which might be legally enforced, to all fraudulent attempts to cause the Government to pay out sums of money."). This would include not just the actual certifications requesting payment, but would include the data relied on in making those certifications and any and all documentation that was submitted or assertions that were made in attempting to win the grants in the first instance. *Harrison v. Westinghouse Savannah River Co.*, 176 F.3d 776, 786 (4th Cir. 1999)("each and every claim submitted under a contract, loan guarantee, or other agreement

which was originally obtained by means of false statements or other corrupt or fraudulent conduct, *or in violation of any statute or applicable regulation*, constitutes a false claim.") (internal quotation and citation omitted)(emphasis in original).

1. The CIDs sufficiently state the nature of the conduct constituting the alleged violation to meet the requirements of FATA.

Virginia Code § 8.01-216.11 provides that any CID issued under FATA "shall state the nature of the conduct constituting the alleged violation of a false claims law that is under investigation . . . ."[4] The University argues that the CIDs in this matter fail to meet this requirement. A review of the CIDs reveals that the University's argument is without merit.

At the outset, it is clear from the CIDs that the Attorney General is investigating whether or not Mann violated three specifically cited provisions of FATA related to his application for and performance under five grants that he identified as being a "U.Va. award," a "U.Va. subcontract," and/or a "U.Va. internal award." Given its response and the arguments it makes on brief, it is clear that the University, while it may disagree with the investigation or think the investigation will not result in findings of culpability, understands what is being investigated. *See* University's Brief, p. 6-8, 11-12 (discussion of grants at issue).

On their face, the CIDs state that the Attorney General is conducting "an investigation . . . into possible violations by Dr. Michael Mann of §§ 8.01-216.3(A)(1), (2), and (3) of FATA." Those subsections specify that FATA liability is established for "any person" who "knowingly presents, or causes to be presented, to an officer or employee of the Commonwealth a false or fraudulent claim for payment or approval," (§ 8.01-216.3(A)(1)), "knowingly makes, uses, or

[4] Any pleading requirements regarding specificity that might be at issue if a FATA suit is ultimately filed are inapplicable at the investigation stage. If the Attorney General had to know with certainty all of the details of the alleged violation before investigating potential violations, what would be the point of even having pre-suit investigations?

causes to be made or used, a false record or statement to get a false or fraudulent claim paid or approved by the Commonwealth," (§ 8.01-216.3(A)(2)), or "conspires to defraud the Commonwealth by getting a false or fraudulent claim allowed or paid . . . ." (§ 8.01-216.3(A)(3)). The CIDs also state that the investigation of these potential violations of FATA "relates to data and other materials that Mann presented in seeking awards/grants funded, in whole or in part, by the Commonwealth of Virginia or any of its agencies as well as data, materials and communications that Mann created, presented or made in connection with or related to" the grants specified in the CIDs. Having specified the particular subsections and stated that the investigation relates to what Mann presented to win or claim payment under the specific grants, the Attorney General has stated "the nature of the conduct constituting the alleged violation of a false claims law that is under investigation . . . ."[5]

2. The University is a "person" for the purposes of Va. Code § 8.01-216.10, and therefore, the CIDs are appropriate.[6]

The University challenges the CIDs arguing that it is exempt from the CID provisions of FATA because it is not a "person" within the intendment of FATA. University's Brief, p. 14. However, a review of the statutory language and the relevant law demonstrates that the CIDs were properly issued in this case.

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[5] To some extent, the University's argument elevates form over substance. At this stage, if the Court were to find that more specifics were required, the Attorney General could issue new CIDs tomorrow that simply restate what is stated in this brief, which, by any conceivable standard, would "state the nature of the conduct constituting the alleged violation of a false claims law that is under investigation . . . ."

[6] Alternatively, the Attorney General would be free to serve a CID on the President of the University, who is clearly a "natural person" and require a deposition in which the Attorney General would learn the identities of the natural persons in the IT department and elsewhere who knew the information or were the custodians of the materials sought by the Attorney General. In turn, the Attorney General would issue CIDs to those "natural persons." There is simply no reason to interpret FATA in a way that would require such a procedure.

FATA defines "person" as "any natural person, corporation, firm, association, organization, partnership, limited liability company, business or trust." Va. Code § 8.01-216.2. Thus, if the University is a "corporation, firm association, organization, partnership, limited liability company, business or trust," it is appropriate to serve it with a CID.

Given the broad language used to define person, it is clear that the General Assembly intended to reach virtually any person, organization or grouping. In contemplation of law, the University is a "corporation." Va. Code § 23-69 ("The board of visitors of the University of Virginia **shall be and remain a corporation**, under the style of 'the Rector and Visitors of the University of Virginia,' and shall have, in addition to its other powers, all the corporate powers given to corporations by the provisions of Title 13.1. . . ."). Given that, by statute, the University is a "corporation," it clearly falls within the definition of "person" for the purposes of FATA.

Even if the University's status as a "corporation" were not settled by statute, the cases cited by the University make clear that a CID may be properly issued to a university or other state agency. The University cites both *Commonwealth ex rel. Pross v. Board of Sup'rs of Spotsylvania* and *Richard L. Deal & Assocs. v. Commonwealth* for the proposition that political subdivisions of the Commonwealth should only be construed as a person for purposes of a statute "if the General Assembly names it expressly or by necessary implication." University's Brief, p. 15. Here, even if the Court were to find that the University does not fall within the statute's express language, the statute applies to the University by necessary implication.

The entire purpose of the CID provision of FATA is to allow the Attorney General to conduct a pre-suit investigation to determine whether a person has made a fraudulent claim on

the Commonwealth, its agencies or political subdivisions. More often than not, the two most essential pieces of documentary evidence-- whatever fraudulent submission was made to induce the government to pay and the record of the government making payment-- will reside with the Commonwealth, its agencies or political subdivisions. It is beyond reason to argue that the statutory scheme is intended to allow the Attorney General to fully investigate a potential FATA violation prior to filing suit but deny him the most essential pieces of evidence in that pre-suit investigation.

Further, to find that the University cannot be served with pre-suit CIDs is inconsistent with FATA as a whole because FATA allows for suits against the University. Virginia Code § 8.01-216.8 provides, in pertinent part, that a circuit court shall not have jurisdiction over a FATA suit brought "against any department, authority, board, bureau, commission, or agency of the Commonwealth [or] any political subdivision of the Commonwealth . . . if the action is based on evidence or information known to the Commonwealth when the action was brought." Thus, if the action is not "based on evidence or information known to the Commonwealth when the action was brought," the circuit courts have jurisdiction over actions brought against governmental entities, such as the University.

An example demonstrates the absurdity of the University's proffered interpretation. If a private citizen brings suit against an agency of the Commonwealth under the *qui tam* provisions of FATA, FATA provides for the suit to be sealed, and the Attorney General is given time to investigate to determine whether to intervene, whether to allow the relator to proceed with the suit or whether to dismiss the action. Va. Code §§ 8.01-216.5 and 8.01-216.6. If the University is correct, in making the determination of whether to intervene, dismiss or allow the *qui tam* relator to proceed, the Attorney General may not seek the actual

documents at the heart of the claim from the one place that they are virtually certain to be—the arm of the Commonwealth that actually was presented the claim and made the payment. Because the whole purpose of the CID provisions of FATA is to allow the Attorney General to conduct a full investigation of a FATA claim prior to bringing suit, the Court should reject the University's construction of the CID provisions that would hinder that purpose, be inconsistent with the plain language of FATA, and lead to absurd results.

3. The grants at issue are potentially subject to the provisions of FATA, and therefore, the CIDs are appropriate.

The University argues that the grants at issue are not subject to FATA because they were grants that involved federal agencies in some respect or because a grant was initially awarded prior to January 1, 2003, the effective date for FATA. University's Brief, p. 6-8, 11. However, a review of each of the grants **as specifically described by Mann** reveals that each of the subject grants is potentially subject to FATA.

In reviewing this argument, it is important to note once again that, because the matter is merely a pre-suit investigation, the Attorney General is entitled to all inferences from the known facts. Even if the actual grant applications ultimately were to demonstrate that the University had no role in the grants, that Mann did not receive any funds directly from the University, and that the University played no role in deciding that Mann would receive funds under the grants, that would not mean that a FATA investigation into the grants was inappropriate. A pre-suit investigation under FATA is conducted "for the purpose of ascertaining **whether** any person is or has been engaged in any violation of this article." Va. Code § 8.01-216.2 (emphasis added). That the documents requested might ultimately lead to the conclusion that no violation of FATA has occurred does not mean that the investigation is unwarranted or outside the scope of FATA.

Of course, nowhere in its filings does the University assert that the grants or grant applications demonstrate that the University had no role in the grants, that Mann did not receive any payment directly from the University or that the University played no role in deciding that Mann would receive funds under the grants. Rather, it skirts the issue, arguing that the "federal grants involve federal funds disbursed by federal agencies." University Brief, p. 11 (no mention of to whom the grants were disbursed). If a federal agency awarded grant money to the University and the University, in turn, awarded and/or paid out the grant, all claims and payments would be subject to FATA. It is irrelevant under FATA what the original source of the funds may have been so long as any portion of the funds was paid out by the Commonwealth in response to a claim for payment. Va. Code § 8.01-216.2 ("claim" under FATA is defined as "any request or demand, whether under a contract or otherwise, for money or property that is made to a contractor, grantee, or other recipient if the Commonwealth provides any portion of the money or property that is requested or demanded, or if the Commonwealth will reimburse such contractor, grantee, or other recipient for any portion of the money or property that is requested or demanded.").

The basis for believing that the University was involved in receiving claims for payment under the grants is Mann himself. For each of the grants at issue, Mann identified the grants as being a "U.Va award," a "U.Va. subcontract," and/or a "U.Va. internal award." This strongly suggests that the University had at least some role in making payments under the grants.

The suggestion is strengthened by the fact Mann did not identify all of the grants he was awarded during his tenure (1999-2005) at the University in a similar fashion. For example, Mann identifies on his C.V. three grants that were initially awarded between 1999

and 2005 that he does not identify as being a "U.Va award," a "U.Va. subcontract," and/or a "U.Va. internal award." *See* Ex. A, p. 4-5. These grants are not the subject of the FATA investigation because, unlike the grants that Mann did identify as a "U.Va award," a "U.Va. subcontract," and/or a "U.Va. internal award," there was no indication from Mann that the University was involved in these grants. The fact that Mann himself identified the subject grants as involving the University strongly suggests that the University had at least some role in making payments under the grants, and thus, the grants are subject to FATA.

Nothing in the materials offered by the University negates the inference that the University was involved in the payment of funds under the grants listed in the CIDs. Quite the contrary, the documents offered suggest that the University was involved. For example, Exhibit 13 attached to the University's Brief deals with a particular grant, "*Decadal Variability in the Tropical Indo-Pacific: Integrating Paleo & Coupled Model Results*, NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigators: M.E. Mann (U.Va), J. Cole (U. Arizona), V. Mehta (CRCES)] **U.Va award** (M.E. Mann): $102,000." (emphasis added). However, Exhibit 13 does not suggest that Mann received money directly from NOAA; rather, the Exhibit specifically states that NOAA awarded funds to "The Rector and Visitors of the University of Virginia," strongly suggesting that the University was involved in making the payments to Mann, explaining why he referred to the grant as a "U.Va. award."[7]

In addition to arguing that the so-called "federal grants" are beyond the scope of FATA, the University argues that the grant Mann describes as a "U.Va. internal award,"

[7] Exhibits 14-16 to the University's brief provide similar information. None of them states that the various grants were paid directly to Mann by a federal agency. If the money passed through a University account and Mann made a claim for money under a grant to the University, the grants are subject to FATA.

Resolving the Scale-wise Sensitivities in the Dynamical Coupling Between Climate and the Biosphere, is outside of the scope of FATA because it was initially "awarded in 2001" and "FATA did not become effective until January 1, 2003." University's Brief, p. 11. However, while the grant was initially awarded in 2001, it did not end at that time. Rather, the grant continued through 2003. Accordingly, if any claim for payment was made and paid after January 1, 2003, the grant is subject to FATA. Thus, even if all of the retroactivity issues raised by the University are correct, there is still sufficient reason to believe that some portion of the grant was paid after January 1, 2003, and therefore, the grant is properly the subject of a FATA investigation.

Ultimately, the only way to know with certainty whether the grants fall within FATA is to review the grants, any claims for payment under the grants, and any payments that were made to see who made the claim for payment, when the claim was made, and what entity or entities made payment (regardless of the original source of the funds). That is why OAG requested such documentation in the CIDs and requested it again after the Petition was filed. If the documents demonstrate that, regardless of where the University initially obtained the funds, any payments under the grants were made after 2003 by the University to Mann or at his request, the grants clearly fall within the scope of FATA.[8]

[8] The fact that the University, having access to the grant paperwork and knowing whether or not the University actually "cut the checks" under the grants, has not explicitly stated that the University did not play a role in making payments under the grants strongly suggests that the University did make such payments. Coupled with the statement of the prior University counsel, that a review of the particular grants and payments had originally led to a conclusion that an objection on the basis of federal involvement in the grants was not well-founded, there is little room to conclude anything other than the CIDs are appropriate in this instance.

4. The information sought by the CIDs is within the scope of a proper investigation under FATA.

In its brief, the University spends just over 5 pages essentially arguing that the CIDs are overbroad and that compliance would unduly burden the University. University's Brief, p. 15-20. However, a review of the claims made makes clear that the University has not stated a valid reason to excuse compliance.

The first claims advanced by the University regarding overbreadth are simply a rehash of the arguments that the referenced grants are outside of the scope of FATA because of federal involvement or for temporal reasons. *Id.* at 15-17. As those arguments have been dealt with above, there is no need to discuss them again. Suffice it to say, there is enough reason to believe that all of the grants at issue are subject to FATA to allow an investigation to move forward to determine if that is indeed the case.

All of the University's claims regarding overbreadth must be viewed skeptically given the history of discussions between representatives of the University and OAG. Prior to the Petition being filed, the University raised the issue of overbreadth with OAG. Specifically, the University requested that, to facilitate finding the documents requested, OAG agree to limit the search to particular departments. The reason given was that there is not a single, University-wide e-mail server, and thus, a department-by-department search would be required. OAG granted this request by letter dated May 6, 2010, limiting the search for hard copies of documents to particular departments and limiting computer searches of e-mail servers to central repositories and any servers or archives maintained by specifically denominated departments. Ex. E. Having granted the University's only request regarding overbreadth, OAG concluded the letter, stating that "if any other issues arise during the

collection of the requested information/documents, please contact [OAG] to discuss potential resolution of the issues." *Id.*

The University did not contact OAG again to raise any issues with overbreadth. Instead, it simply filed the Petition asserting that the CIDs were overbroad. The only conversation after the filing of the Petition regarding the scope of the documents sought occurred when OAG raised an issue with counsel for the University. Specifically, having received the Petition, OAG noted that, if the grant and payment documents requested showed no claims for payment made on the University and no payments made by the University related to the grants, that might obviate the need for the remainder of the investigation. Accordingly, OAG asked the University to produce those documents (grant information and payment information) that the University contended would show that FATA was not implicated. The University's counsel indicated he would have to discuss that with his client; no response to the request has been received as of the filing of this brief. Simply put, the OAG agreed to limit the scope of the requests when asked to do so by the University and suggested how a partial production might obviate the need for a complete production. The University's failure to acknowledge the former and its failure to respond to the latter strongly suggests that the claims of overbreadth and burden are purely tactical.

Turning to the information requested, all of the information related to the grant applications and payments under the grants are relevant to the investigation. The data underlying Mann's work on the grants at issue is necessary in order to compare it to what was actually reported and to ascertain if his past reported practices, such as creating the file marked "CENSORED," have been repeated. The other research, data and e-mails, whether or not directly connected to the specified grants, could produce relevant information because, to

the extent that Mann sought the grants based on his prior work (or based on his reputation built on his prior work) and knew that he had manipulated or misrepresented that prior work, that would constitute fraud under FATA. *Harrison v. Westinghouse Savannah River Co.*, 176 F.3d at 786 ("each and every claim submitted under a contract, loan guarantee, or other agreement *which was originally obtained* by means of false statements or other corrupt or fraudulent conduct, *or in violation of any statute or applicable regulation*, constitutes a false claim.").

Turning to the e-mails, they are being sought because, in assessing whether a fraud action should be brought, Mann's state of mind is relevant. It would not be enough under FATA for the Commonwealth to prove that Mann submitted erroneous results or had carelessly written a computer program that created a "hockey stick" regardless of the data introduced. Rather, the Commonwealth would have to show that Mann knowingly manipulated data, that he knew or should have known that the data and applications he was presenting related to the grants were false or that he was withholding information he had a duty to disclose. The best way to prove his state of mind is to review the statements he made before, during and after the grants.[9]

In crafting the requests for e-mails, OAG limited the e-mails sought to those most likely to reveal pertinent information. The CIDs do not ask for e-mails to/from family members or Mann's friends who are not involved in his research activities.[10] Specifically, as the University notes, the requests deal with e-mail activity related to "thirty-nine scientists and all of Dr. Mann's research assistants, secretaries and administrative assistants." Certainly

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[9] For example, an instruction to someone to destroy data or e-mails after the fact, even if written yesterday, would be indicia of fraudulent intent.

[10] This is not to say that such requests would be invalid as it is certainly reasonable to believe that such e-mails shed light on whether or not Mann was committing fraud and knew it.

it is reasonable to believe that, if there are e-mails showing fraud or knowledge of fraud, one of the listed people would have been a recipient or sender.

Ultimately, as with most of the University's arguments, the overbreadth argument fails because of the deference due the Attorney General at this stage of the proceedings. Because this is an investigation, the CIDs are entitled to judicial deference. As the United States Supreme Court sated in *Morton Salt*, "[i]t is sufficient if the inquiry is within the authority of the agency, the demand is not too indefinite and the information sought is reasonably relevant." 338 U.S. at 652. Here, there is no question that FATA investigations fall within the power of the Attorney General. Similarly, there is no question that the CIDs are not "too indefinite" because the University has never contended that they do not know what to look for, only that they do not wish to look. Lastly, as demonstrated above, the request is reasonably calculated to lead to the discovery of information that is relevant to the investigation. The Attorney General has met the standard.

Finally, the University, without specifying exactly how, contends that the CIDs are unduly burdensome. Of course, as noted above, OAG responded to the University's only request to limit the scope of the inquiry by granting the request. Ex. E. Further, given that most of the information will be saved on computer, the task is to basically conduct computer searches using relevant search terms to see what is there. In an age of e-discovery, private litigants do this routinely. As a result of FOIA, government agencies do it daily. In fact, the University claims to have already searched for many of the e-mails in response to a FOIA request it received in December. Thus, the search is already partially completed with the only wrinkle being having to search the previously overlooked back-up e-mail server containing

responsive documents that was "discovered" as a result of the search put in motion by the CIDs.

Ultimately, the CIDs seek nothing that would not be discoverable as a matter of course if a FATA suit were ultimately brought. Given that investigatory requests are due more deference than discovery requests in a judicial proceeding, *see Morton Salt*, the CIDs are proper, and the Court should order the University to comply.

C. The University has failed to demonstrate that the CIDs violate any constitutional or other legal right or privilege belonging to the University.

Virginia Code § 8.01-216.18(C) provides, in part, that a recipient of a CID may challenge it "based . . . upon any constitutional or other legal right or privilege of such person." Thus, the University may challenge the CIDs based on any constitutional or other legal rights or privileges that it possesses, but it may not raise any such rights it contends belong to others. A review of the claims made by the University reveals that no constitutional or other legal right or privilege belonging to the University is implicated by the CIDs. Accordingly, the Court should order the University to comply with them.

1. Neither the First Amendment nor concepts of academic freedom shield the information sought in the CIDs from review by the Attorney General.

As the Fourth Circuit has recognized, "'[a]cademic freedom' is a term that is often used, but little explained, by federal courts." *Urofsky v. Gilmore*, 216 F.3d 401, 410 (4th Cir. 2000) *en banc, cert. denied*, 531 U.S. 1070 (2001). The *Urofsky* court, which rejected an assertion by university professors that a state statute was unconstitutional because it violated their academic freedom by prohibiting them from using state resources to conduct certain types of research, comprehensively discusses the history and significant limitations on the concept of academic freedom as constitutional right. *Id.* at 410-415.

In dealing with any claim of academic freedom, it must be remembered that the doctrine, to the extent it applies, only arises out of the First Amendment, a point the University concedes. University's Brief, p. 21 (academic freedom is a "First Amendment concern."). Thus, by definition, it offers no protections for things that fall outside of the protections of the First Amendment—such as fraud and fraud investigations.

The First Amendment has never been held to protect fraud or to invalidate laws that prohibit/investigate/punish fraud. As the United States Supreme Court has held,

> the First Amendment does not shield fraud. See, *e.g., Donaldson* v. *Read Magazine, Inc.*, 333 U.S. 178, 190, 92 L. Ed. 628, 68 S. Ct. 591 (1948) (the government's power "to protect people against fraud" has "always been recognized in this country and is firmly established"); *Gertz* v. *Robert Welch, Inc.*, 418 U.S. 323, 340, 41 L. Ed. 2d 789, 94 S. Ct. 2997 (1974) (the "intentional lie" is "no essential part of any exposition of ideas") (internal quotation marks omitted). Like other forms of public deception, fraudulent charitable solicitation is unprotected speech. See, *e.g., Schneider* v. *State (Town of Irvington)*, 308 U.S. 147, 164, 84 L. Ed. 155, 60 S. Ct. 146 (1939) ("Frauds," including "fraudulent appeals . . . made in the name of charity and religion," may be "denounced as offenses and punished by law."); *Donaldson*, 333 U.S., at 192, 92 L. Ed. 2d 628, 68 S. Ct. 591 ("A contention cannot be seriously considered which assumes that freedom of the press includes a right to raise money to promote circulation by deception of the public.").

Illinois v. Telemarketing Associates, Inc., 538 U.S. 600, 611-12 (2003). In April, the Court once again recognized that the First Amendment has never protected fraud, noting that

> From 1791 to the present, however, the First Amendment has permitted restrictions upon the content of speech in a few limited areas, and has never include[d] a freedom to disregard these traditional limitations. These historic and traditional categories long familiar to the bar, including obscenity, defamation, **fraud**, incitement, and speech integral to criminal conduct, are well-defined and narrowly limited classes of speech, **the prevention and punishment of which have never been thought to raise any Constitutional problem.**

United States v. Stevens, ___ U.S. ___, ____ 2010 U.S. LEXIS 3478, * 14-15 (2010) (emphasis added) (internal citation and quotation omitted). Neither the First Amendment nor

concepts of academic freedom prevent the Attorney General from investigating potential fraud in applications for and the performance of government funded research grants.

That FATA would be used to investigate potential fraud in the procurement and performance of government research grants by university faculty is simply not surprising. After all, many such actions have been brought under the federal False Claims Act, which the University concedes is an appropriate analogue for interpreting FATA. University's Brief, p.10, n. 8. *See, e.g., United States v. University of Pittsburgh*, 192 F.3d 402, 405 (3rd Cir. 1999); *United States v. Board of Trustees of the University of Alabama*, 104 F.3d 1453 (4th Cir. 1997); *United States v. University of Texas*, 961 F.2d 46 (4th Cir. 1992). Given that the federal analogue to FATA has been used to bring actions for money damages against university researchers applying for and working under government grants, it is simply absurd to contend that FATA does not allow a pre-suit investigation regarding the conduct of university researchers applying for and working under government grants.

Ultimately, as it must, even the University concedes that neither academic freedom nor the First Amendment shields a university professor from investigation related to possible fraud. University's Brief, p. 22 ("the University is not suggesting that academic freedom automatically and always trumps the Commonwealth's interest in investigating potential fraud."). If any portion of the CIDs are proper under FATA, neither academic freedom nor the First Amendment exempt the University from complying with the CIDs.

2. The University cannot refuse to comply with CIDs by invoking the alleged constitutional rights of faculty members.

Even if there were not a well-recognized fraud exception to the First Amendment, the University's claims that the CIDs violate the constitutional rights of "faculty and researchers." University's Brief, p. 20; *See also, id.* at 22-26. Such claims are not cognizable by this Court

for two reasons. First, the University may not raise the constitutional rights of others in a challenge to a CID. Second, as the Fourth Circuit has made abundantly clear, academic freedom concerns are not implicated in this context.

First and foremost, Va. Code § 8.01-216.18(C), provides that a person receiving the CID may challenge it "based . . . upon any constitutional or other legal right or privilege of such person," that is, the person who received the CID. In this case, the statute allows the University to raise any rights it has, but it does not allow the University to raise any rights it believes other people have. Because Va. Code § 8.01-216.18(C) limits challenging a CID to the rights of the recipients and not the rights of others, the Court may not even entertain the University's argument that the CIDs somehow violate the rights of others.

Even if the University could assert the "academic freedom" rights of others, the Fourth Circuit has made clear that academic freedom concerns are not implicated in this context. In asserting that rights of others should shield a professor from a fraud investigation that is authorized by a statute of general application (such as FATA), the University is asking this Court to create a right that the United States Supreme Court has never recognized. As the Fourth Circuit stated, "the Supreme Court has **never** set aside a state regulation on the basis that it infringed a First Amendment right to academic freedom." *Urofsky*, 216 F.3d at 412 (emphasis added).

Although it had already found that there was no constitutional right for professors to be exempted from laws of general application, the *Urofsky* court felt compelled to comment on how such an argument-- that university faculty members have First Amendment rights that "normal" citizens do not-- was simply inconsistent with the American constitutional scheme. The Court noted

> that the argument raises the specter of a constitutional right enjoyed by only a limited class of citizens. Indeed, the audacity of Appellees' claim is revealed by its potential impact in this litigation. If Appellees are correct that the First Amendment provides special protection to academic speakers, then a professor would be constitutionally entitled to conduct a research project on sexual fetishes while a state-employed psychologist could constitutionally be precluded from accessing the very same materials. Such a result is manifestly at odds with a constitutional system premised on equality.

Urofsky, 216 F.3d at 412, n. 13 (internal citation omitted). The *Urofsky* court then noted that cases such as *Sweezy* and *Keyishian* only stand for the proposition that a university professor has a right to speak and associate freely in his capacity as a private citizen. *Id.* at 413, 414. As the *Urofsky* court concluded,

> [t]aking all of the cases together, the best that can be said for Appellees' claim that the Constitution protects the academic freedom of an individual professor is that teachers were the first public employees to be afforded the now-universal protection against dismissal for the exercise of First Amendment rights. Nothing in Supreme Court jurisprudence suggests that the "right" claimed by Appellees extends any further.

Id at 415. Neither the First Amendment nor concepts of academic freedom found therein exempt university professors from laws pertaining to fraud on the government or otherwise grant them a license to commit fraud free from even a government investigation.

Given the focus that the University and its faculty have placed on the academic freedom issue, it may be helpful to remember exactly what is being investigated. The Attorney General is not investigating what Mann taught in class, what groups he belongs to, what political or policy positions he takes, what he chooses to study or research, or what, he, separate and apart from his use of government funds, reports as his research findings. Mann (and any current University professor) is free to, consistent with his contract with the University, teach whatever he wishes, advocate his policy or political preferences, extol the virtues of Post Normal Science, and/or report any private research results in the manner he

sees fit. The Attorney General is only investigating whether fraudulently manipulated data was used to win government funding and/or submitted in an effort to claim payment under government funded grants. Other activities are not subject to FATA, and thus, are not part of the Attorney General's investigation.

3. The University has not asserted in its Petition any recognized privilege that would shield the requested information from production.

To date, the University has still failed to specify which, if any, documents sought are actually subject to a claim of privilege and has not specified what, if any, legally recognized privilege is claimed regarding any of the requested documents. Having failed to specifically raise such issues in either its Petition or its Brief, the University has waived any such claims or, at least, has not properly placed such claims before the Court. Accordingly, claims of privilege cannot serve as a basis for the University's refusal to comply with the CIDs.

Conclusion

For the reasons stated above, this Court should deny the Petition.

KENNETH T. CUCCINELLI, II, in his capacity
as ATTORNEY GENERAL OF VIRGINIA

By: _____
COUNSEL

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Counsel for Respondent

CERTIFICATE OF SERVICE

I hereby certify that, on July 13th, 2010, a true and correct copy of the foregoing Answer was sent via e-mail and First Class United States mail, postage prepaid, to:

Chuck Rosenberg, VSB # 44727
HOGAN LOVELLS US LLP
Columbia Square
555 Thirteenth Street, NW
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Counsel for Petitioner

Curriculum Vitae

Michael E. Mann

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Tel: (814) 863-4075; FAX (814) 865-3663; email: mann@psu.edu
website: http://www.meteo.psu.edu/~mann

Education

1998 Ph.D. Yale University, Department of Geology & Geophysics (defended 1996)
1993 M.Phil. Yale University, Department of Geology & Geophysics
1991 M.Phil. Yale University, Department of Physics
1991 M.S. Yale University, Department of Physics
1989 A.B. (double), University of California-Berkeley, Applied Math, Physics (Honors)

Honors and Awards

2008 Profiled in *American Environmental Leaders From Colonial Times to the Present*
2008 Website "RealClimate.org" (co-founded by M. Mann) chosen as one of top 15 "green" websites by *Time Magazine* (April 2008)
2007 Co-awarded (along with several hundred other scientists) the 2007 Nobel Peace Prize for involvement in the *Intergovernmental Panel on Climate Change* (lead author of chapter 2 of the Third Assessment Report, 2001)
2006 American Geophysical Union Editors' Citation for Excellence in Refereeing (for '*Geophysical Research letters*')
2005 Website "RealClimate.org" (co-founded by M. Mann) chosen as one of top 25 "Science and Technology" websites by *Scientific American*
2005 John Russell Mather Paper award for 2005 by the Association of American Geographers [for article: Frauenfeld, O., Davis, R.E., and Mann, M.E., A Distinctly Interdecadal Signal of Pacific Ocean-Atmosphere Interaction, *Journal of Climate* 18, 1709-1718, 2005]
2002 Named by *Scientific American* as one of 50 leading visionaries in science and technology
2002 Outstanding Scientific Paper award for 2002 by NOAA Office of Oceanic and Atmospheric Research (OAR) [for article: Delworth, T.L., Mann, M.E., Observed and Simulated Multidecadal Variability in the Northern Hemisphere, *Climate Dynamics,* 16, 661-676, 2000]
2002 Article [Mann et al, "Global-scale temperature patterns and climate forcing over the past six centuries", *Nature*, 392, 779-787, 1998] selected for 'fast moving fronts' by Institute for Scientific Information (ISI)
2002 Selected as one of 10 'Mead Honored Faculty', University of Virginia
1998 Council of Graduate Schools' Distinguished Dissertation Award, nominated
1997 Phillip M. Orville Prize for outstanding dissertation in the earth sciences, Yale University
1996 Alexander Hollaender Distinguished Postdoctoral Fellowship (DOE)
1989 Josiah Willard Gibbs Prize for outstanding research and scholarship in Physics, Yale University

Professional Experience (1996-present)

2009- *Professor*, Pennsylvania State University, Department of Meteorology
2005-09 *Associate Professor*, Pennsylvania State University, Department of Meteorology [joint appointments in Department of Geosciences and Earth and Environmental Systems Institute (EESI)]
2005- *Director*, Earth System Science Center (ESSC), Pennsylvania State University
1999-05 *Assistant Professor*, University of Virginia, Department of Environmental Sciences
1998-99 *Research Assistant Professor*, University of Massachusetts, Department of Geosciences
1997-98 *Adjunct Assistant Professor,* University of Massachusetts, Department of Geosciences
1996-98 *Alexander Hollaender Distinguished Postdoctoral Research Fellow* (DOE)

Courses Taught

Penn State University:	
EARTH 2	*The Earth System and Global Change*
EM SC 100S	*Climate Change and Potential Societal Impacts (1st year seminar)*
ENNEC 472	*Quantitative Analysis in the Earth Sciences*
METEO 470	*Climate Dynamics*
METEO 523	*Climate Modeling*
METEO 597B/GEOSCI 597B	*Climate Dynamics Seminar*
University of Virginia:	
EVSC 181	*Climate Change: Past and Future*
EVSC 350	*Atmosphere and Weather*
EVSC 495	*Capstone Seminar: The Arctic*
EVCS 494/495/EVAT795	*Data Analysis & Climate Change*
EVSC 494/EVAT 796	*Climate and the History of Human Culture*
EVAT 554	*Ocean-Atmosphere Dynamics*
EVAT 793	*Statistical Climatology*
EVAT 795	*Modeling of Climate Variability*
University of Massachusetts:	
GEO 591	*Data Analysis & Climate Change*

Mentoring

Postdoctoral Researchers:

Penn State University (2005-)

Dept. of Meteorology:

- *Zhihua Zhang*, 2005-09
- *Ryan Sriver (NOAA Postdoctoral Fellow)*, 2008-

University of Virginia (1999-2005)

Dept. of Environmental Sciences:

- *Feinbao Ni* (joint w/ M. Hughes, University of Arizona), 2002-2003
- *Pedro Ribera,* (Visiting postdoctoral research fellow, University of Vigo, Spain), 2000
- *Scott Rutherford*, 2000-2003
- *Mei-Yu* (joint w/ H. Epstein), 2002-2003

Graduate Students:

Penn State University (2005-)

Dept. of Meteorology:

- *Liang Ning*, Ph.D. candidate: major adviser, 2008-
- *Fangxing Fan*, Ph.D. candidate: major adviser, 2005-
- *Muge Komercu*, Ph.D. candidate: co-adviser, 2006-08

- *Brandon Katz*, M.S. 2009: co-adviser, 2006-09
- *Thomas Sabbatelli*, M.S. 2009 (*AMS Graduate Fellow*): co-adviser, 2008-09
- *Aviva Braun*, M.S. 2009: committee member, 2008-09
- *Maria Herrmann*, Ph.D. candidate: committee member, 2008-

Dept. of Geosciences:

- *Patrick Applegate*, Ph.D. 2009: committee member, 2005-09
- *Joshua Dorin*, M.S. 2008: committee member, 2006-08
- *John Mischler*, M.S. 2008: committee member, 2007-08

Dept. of Geography:

- *Chris Karmosky*, Ph.D. candidate: committee member, 2009-

Dept. of Civil and Environmental Engineering

- *Kathryn van Werkhoven*, Ph.D. 2008: committee member, 2007-08

University of Virginia (1999-2005)

Dept. of Environmental Sciences:

- *Julian Adams*, M.S. 2003: major adviser, 2000-2003
- *Kaycie Billmark*, Ph.D. 2003: committee member, 1999-2003
- *Joel Carr*, M.S. 2002: committee member, 2000-2002
- *Peter Cleary*, M.S. 2004: co-adviser, 2002-2004
- *Benjamin Cook*, M.S. 2004; Ph.D. 2007: co-adviser, 2001-2005
- *Dan Druckenbrod*, Ph.D. 2003: committee member, 1999-2003
- *Oliver Frauenfeld* Ph.D. 2003: committee member, 2001-2003
- *Ian German-Mesner*, M.S. candidate: major adviser, 2002-
- *Kevin Jones*, M.S. 2002: committee member, 2001-2002
- *Courtney Strong*, Ph.D. 2005: committee member, 2003-2005
- *Tana Wood*, M.S. 2002; Ph.D. 2005: committee member, 2001-2005
- *Zhihua Zhang*, Ph.D. 2006: major adviser, 2000-2006

University of Massachusetts (1997-1999)

Dept. of Geosciences:

- *Caspar Ammann*, Ph.D. 2000: co-adviser, 1998-2000
- *Anne Waple*, Ph.D. 1999: co-adviser and committee member, 1997-1999
- *Bo-Min Sun*, Ph.D. 1999: committee member, 1998-1999

External Committee Member (2001-)

- *Heidi Cullen*, Ph.D. 2001: external committee member, Columbia University, 2000-01
- *Silvia Venegas*, Ph.D. 2001: external committee member, University of Copenhagen, 2000-01

Undergraduates:

Penn State University (2005-)

Dept. of Meteorology:

- *Thomas Sabbatelli*, 2005-2008

University of Virginia (1999-2005)

Dept. of Environmental Sciences:

- *Michelle L'Heureux*, Distinguished Majors Research Project, University of Virginia, 2001-02.

Primary Research Interests

(1) Climate signal detection and climate change attribution; (2) Statistical and time series analysis methods; (3) High-resolution paleoclimate reconstruction; (4) Study of forced and internal variability in coupled ocean-atmosphere models; and model/data intercomparison; (5) Coupled ocean-atmosphere modeling; (6) Use of climate scenarios to drive process-oriented models of environmental phenomena

Funded Proposals

2010-2013 *Development of a Northern Hemisphere Gridded Precipitation Dataset Spanning the Past Half Millennium for Analyzing Interannual and Longer-Term Variability in the Monsoons*, NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigators: Q. Hu, S. Feng, R.J. Oglesby (Univ. of Nebraska), M.E. Mann (Penn State Univ.)] PSU award (M.E. Mann): $250,000

2009-2013 *Quantifying the influence of environmental temperature on transmission of vector-borne diseases,* NSF-EF [Principal Investigator: M. Thomas; Co-Investigators: R.G. Crane, M.E. Mann, A. Read, T. Scott (Penn State Univ.)] $1,884,991

2009-2012 *Toward Improved Projections of the Climate Response to Anthropogenic Forcing: Combining Paleoclimate Proxy and Instrumental Observations with an Earth System Model,* NSF-ATM [Principal Investigator: M.E. Mann; Co-Investigators: K. Keller (Penn State Univ.), A. Timmermann (Univ. of Hawaii)] $541,184

2008-2011 *A Framework for Probabilistic Projections of Energy-Relevant Streamflow Indices,* DOE [Principal Investigator: T. Wagener; Co-Investigators: M. Mann, R. Crane, K. Freeman (Penn State Univ.)] $330,000

2008-2009 *AMS Industry/Government Graduate Fellowship* (Anthony Sabbatelli), American Meteorological Society [Principal Investigator: M.E. Mann (Penn State Univ.)] $23,000

2006-2009 *Climate Change Collective Learning and Observatory Network in Ghana,* USAID [Principal Investigator: P. Tschakert; Co-Investigators: M.E. Mann, W. Easterling (Penn State Univ.)] $759,928

2006-2009 *Analysis and testing of proxy-based climate reconstructions,* NSF-ATM [Principal Investigator: M.E. Mann (Penn State Univ.)] $459,000

2006-2009 *Constraining the Tropical Pacific's Role in Low-Frequency Climate Change of the Last Millennium*, NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigators: K. Cobb (Georgia Tech Univ.), N. Graham (Hydro. Res. Center), M.E. Mann (Penn State Univ.), Hoerling (NOAA Clim. Dyn. Center), Alexander (NOAA Clim. Dyn. Center)] PSU award (M.E. Mann): $68,065

2006-2007 *Acquisition of high-performance computing cluster for the Penn State Earth System Science Center (ESSC)*, NSF-EAR [Principal Investigator: M.E. Mann, Co-Investigators: R. Alley, M. Arthur, J. Evans, D. Pollard (Penn State Univ.)] $100,000

2003-2006 *Decadal Variability in the Tropical Indo-Pacific: Integrating Paleo & Coupled Model Results*, NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigators: M.E. Mann (U.Va), J. Cole (U. Arizona), V. Mehta (CRCES)] U.Va award (M.E. Mann): $102,000

2002-2005 *Reconstruction and Analysis of Patterns of Climate Variability Over the Last One to Two Millennia,* NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigator: M.E. Mann, Co-Investigators: S. Rutherford, R.S. Bradley, M.K. Hughes] $315,000

2002-2005 *Remote Observations of Ice Sheet Surface Temperature: Toward Multi-Proxy Reconstruction of Antarctic Climate Variability*, NSF-Office of Polar Programs, Antarctic Oceans and Climate System [Principal Investigators: M.E. Mann (U. Va), E. Steig (U. Wash.), D. Weinbrenner (U. Wash)] U.Va award (M.E. Mann): $133,000

2002-2003 *Paleoclimatic Reconstructions of the Arctic Oscillation,* NOAA-Cooperative Institute for Arctic Research (CIFAR) Program [Principal Investigators: Rosanne D'Arrigo, Ed Cook (Lamont/Columbia); Co-Investigator: M.E. Mann] U.Va subcontract (M.E. Mann): $14,400

2002-2003 *Global Multidecadal-to-Century-Scale Oscillations During the Last 1000 years,* NOAA-Climate Change Data & Detection (CCDD) Program [Principal Investigator: Malcolm Hughes (Univ. of Arizona); Co-Investigators: M.E. Mann; J. Park (Yale University)] U.Va subcontract (M.E. Mann): $20,775

2001-2003 *Resolving the Scale-wise Sensitivities in the Dynamical Coupling Between Climate and the Biosphere,* University of Virginia-Fund for Excellence in Science and Technology (FEST)

[Principal Investigator: J.D. Albertson; Co-Investigators: H. Epstein, M.E. Mann] U.Va internal award: $214,700

2001-2002 *Advancing predictive models of marine sediment transport,* Office of Naval Research [Principal Investigator: P. Wiberg (U.Va), Co-Investigator: M.E. Mann] $20,775

1999-2002 *Multiproxy Climate Reconstruction: Extension in Space and Time, and Model/Data Intercomparison*, NOAA-Earth Systems History [Principal Investigator: M.E. Mann (U.Va), Co-Investigators: R.S. Bradley, M.K. Hughes] $381,647

1998-2000 *Validation of Decadal-to-Multi-century climate predictions,* DOE [Principal Investigator: R.S. Bradley (U. Mass); Co-Investigators: H.F. Diaz, M.E. Mann]

1998-2000 *The changing seasons? Detecting and understanding climatic change*, NSF-Hydrological Science [Principal Investigator U. Lall (U. Utah); Co-investigators: M.E. Mann, B. Rajagopalan, M. Cane] $266,235K

1996-1999 *Patterns of Organized Climatic Variability: Spatio-Temporal Analysis of Globally Distributed Climate Proxy Records and Long-term Model Integrations,* NSF-Earth Systems History [Principal Investigator: R.S. Bradley (U. Mass); Co-Investigators: M.E. Mann, M.K. Hughes] $270,000

1996-1998 *Investigation of Patterns of Organized Large-Scale Climatic Variability During the Last Millennium*, DOE, Alexander Hollaender Postdoctoral Fellowship [M.E. Mann] $78,000

Professional Activities

2009 Co-convener/organizer (w/ G. Stone, A. Buddington), Pardee Keynote Symposium on `` Crisis In The Cryosphere", *GSA Annual Meeting*

2009- Guest Editor, *Proceedings of the National Academy of Sciences*

2009 Panel Discussion Participant, "Communicating Climate Change", National Science Foundation, Arlington VA, 2009, January 8

2007-08 Associate Editor, *G-Cubed*, special issue on "Tropical Cyclone-Climate Interactions on All Time Scales"

2007 Co-convener/organizer (w/ P. Jones), IAMAS session on ``The Holocene-Anthropocene Transition: From Natural to Human-Dominance of the Earth System", *IUGG* 24th General Assembly

2007-08 Member of steering committee, "post-Earth Systems History" workshop, NSF

2007 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the last millennium", 4th General Assembly, *European Geophysical Union*

2006 Co-convener/organizer (w/ K. Emanuel, M. Huber, J. Gulledge, P. Webster), theme session ``Tropical Cyclone-Climate Interactions on All Time Scale", Annual Fall meeting, *American Geophysical Union*

2006 Provided testimony to U.S. House of Representatives ('Energy and Commerce' Committee hearing, July 27)

2006 Co-chair, Workshop on "Past Millennia Climate Variability", Wengen Switzerland

2006 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the last millennium", 3rd General Assembly, *European Geophysical Union*

2005- Editorial advisory board, *The Holocene*

2005-06 Expert Reviewer, Working Group I report, *Intergovernmental Panel on Climate Change (IPCC)*, Fourth Assessment Report

2005 Co-convener/organizer (w/ J. D. Gong and Luterbacher), special session ``Explaining the Climates of Historic Times: Detection and Attribution of Anthropogenic Influences'', Biennial Assembly of *IAMAS*

2005 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the last millennium", 2nd General Assembly, *European Geophysical Union*

2004 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the past millennium", 1st General Assembly, *European Geophysical Union*

2003-04 Member, National Academy of Sciences/National Research Council *Committee on Radiative Forcing Effects on Climate*

2003 Provided testimony to U.S. Senate ('Environment and Public Works' Committee hearing, July 29)

2003 Chair of organizing committee, National Academy of Sciences *Frontiers of Science* symposium

2003 Co-convener/organizer (w/ P. Jones, V. Masson-Delmotte), IAMAS session on `` Climate of the Holocene", *IUGG*

2003 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the past millennium", 28th General Assembly, *European Geophysical Society*

2003-05 Advisory board member for *Scientific American* 'Scientific American 50'

2003 Invited Participant, *Workshop on Estimating Climate Sensitivity*, National Academy of Sciences

2003-06 Member of steering committee, NSF Marine Earth Systems History (MESH) Panel

2003-05 Committee on Probability & Statistics, American Meteorological Society

2002- IAMAS delegate for U.S./International Commission on Climate (ICCL)

2002 Organizing committee, National Academy of Sciences *Frontiers of Science* symposium

2002 Co-convener/organizer (w/ H. Von Storch, R. Brazdil), theme session ``Understanding the Late Maunder Minimum climate anomaly", Annual Spring meeting, *American Geophysical Union*

2002 Co-convener/organizer (w/ J. Jouzel, P. Jones, W. Dullo), special session `` Climate of the past millennium", 27th General Assembly, *European Geophysical Society*

2001-02 Member, advisory board, *Earth Interactions* (American Geophysical Union)

2001 Chair/Organizer, session on "Climate Change Detection/Attribution", National Academy of Science *Frontiers of Science* annual symposium, Irvine, California, Nov 8-10, 2001.

2001 Organizer and Host, *PAGES/CLIVAR workshop on Reconstructing Late Holocene Climate*, Charlottesville, Virginia, April 17-20, 2001.

2001 Co-convener/organizer (w/ J. Jouzel, P. Jones), special session `` Climate of the past millennium", 26th General Assembly, *European Geophysical Society*

2001 Co-convener/organizer, *NASA /IPRC/ CLIVAR workshop on Decadal Climate Variability*, Manoa, Hawaii, Jan 8-12, 2001.

2000- Member of Working Group, *International PAGES/CLIVAR*

2000-04 Panel member, *NOAA Climate Change Data and Detection Program*

2000-02 Editor, *Journal of Climate*

2000 Co-convener (w/ J. Jouzel, P. Jones), special session `` Climate of the past millennium", 25th General Assembly, *European Geophysical Society*

1999 Co-convener/organizer (w/ J. Jouzel), special session ``Data and model studies of climate changes over the last millennium", 24th General Assembly, *European Geophysical Society*

1999 Invited adviser, *NOAA Global Change and Climate Panel*, Boulder, CO

1999 Guest editor, special issue of *Climatic Change*

1999 Co-convener (w/ J. Overpeck), PAGES/CLIVAR workshop on multiproxy climate reconstruction, Boulder, CO

1998-00 Lead author, Chapter 2, *Intergovernmental Panel on Climate Change (IPCC)*, Third Assessment Report

1998-00 Contributing author, Chapters 7,8,12, *Intergovernmental Panel on Climate Change (IPCC)*, Third Assessment Report

1997 Co-convener/organizer (w/ E. Cook, H. Pollack, D. Chapman) , theme session ``Multiproxy Climate Reconstruction...", Annual Fall meeting, *American Geophysical Union*

- Memberships: *American Meteorological Society; American Geophysical Union; European Geophysical Society; Geological Society of America; American Physical Society; American Association for the Advancement of Science; Sigma Xi*

- Reviewer for: *Nature, Science, PNAS, Geology, Climatic Change, Geophysical Research Letters, Journal of Climate, JGR-Oceans, JGR-Atmospheres, Paleoceanography, Climate Dynamics, Eos, Int. J. Climatol., Water Resources Research, Holocene; GSA Today; Climate of the Past; Earth and Planetary Science Letters; Global & Planetary Change; Water Resources Research; Atmospheric & Solar-Terrestrial Physics; Climate Research; PLoS Biology; National Research Council/National Academy of Sciences;* IPCC AR5, NSF, NOAA, DOE grant programs; U.S. CCSP; several books.

Public Outreach:

- Popular Media (interviewed/quoted/cited):
  Television: *CBS Evening News, NBC Evening News, ABC Evening News, NBC Today Show, CNN, CNN headline news, CNN (Lou Dobbs show), CNN (Campbell Brown Show), MSNBC, PBS, BBC Channel 2; The Weather Channel, The Research Channel, Accuweather ("Headline Earth"), Weather World (PCN) (and numerous local television news programs)*
  Radio: *BBC, NPR ("All Things Considered"; "Talk of the Nation"; "Earth and Sky"; "Science Friday"; "Diane Rehm Show"; "On Point with Tom Ashbrook"), PRI ("To The Point"), WCBS, Voice of America; Pennsylvania Public Radio; "Explorations in Science" with Michio Kaku, KTRH radio (Houston), Radio PA (Harrisburg), WWL Radio News (New Orleans) (and numerous others)*
  Print (weekly/monthly): *Time, Newsweek, Life, US News & World Report, New Republic, Economist, Rolling Stone, Vanity Fair, Mother Jones, American Prospect, The Nation, Chronicle of Higher Education, Miller-McCune (and numerous others)*
  Print (weekly/monthly, scientific): *Scientific American, New Scientist, National Geographic, Discover, Science News, Science, Nature, Popular Science, Seed, Cosmos, Geotimes, Weekly Reader ("current science"), Audubon Magazine (and numerous others)*
  Print (daily): *USA Today, New York Times, New York Times "Science Times", New York Daily News, Washington Post, Wall Street Journal, National Journal, Boston Globe, Los Angeles Times, San Francisco Chronicle, Seattle Times, Houston Chronicle, Chicago Tribune, International Herald Tribune, Philadelphia Inquirer, Pittsburgh Tribune-Review, Pittsburgh Post-Gazette, Miami Herald, Washington Times, Christian Science Monitor; National Post (Canada); London Times (UK), The Guardian (UK), Die Welt (Germany), Le Monde (France), Pravda (Russia) (and numerous others)*
  Print (daily, syndicated): *AP, UPI, Reuters, Scripps Howard, Knight Ridder, McClatchy, Ascribe, Greenwire*
  Online: *Salon.com, Slate.com, Discovery Channel online, National Geographic online, LiveScience (and numerous others)*
  Profiles: *Scientific American, Discover, New Scientist, Mother Jones, Audubon Magazine, Williamsport Guardian*
  Other: *Museum of Modern Art (New York)*, assistance with exhibition on "Design and the Elastic Mind", Fall 2007
- Op-eds published: *Voices of Central Pennsylvania* (Feb 2010), *Washington Post* (Dec 18, 2009), *Harrisburg Patriot-News* (PA; Feb 11, 2007), *St Louis Post-Dispatch* (Feb 23, 2006), *The Press* (NJ; Feb 7, 2006), *Roanoke Times* (VA, Feb 7, 2006), *Middleton Times-Herald* (NY; Feb 7, 2006), *Akron Beacon Journal* (Feb 6, 2006), *Anniston Star* (AL; Feb 5, 2006), *Newark Star-Ledger* (Feb 5, 2006), *Salt Lake Tribune* (Feb 3, 2006), *Post Standard* (NY; Feb 2, 2006), *Providence Journal* (Oct 3, 2003), *Seattle News-Tribune* (Aug 10, 2003), Washington Post (Dec 18, 2009; reprinted in *Miami Herald 12/19/09*, *Salt Lake Tribune 12/18/09*, and *Monterey Herald 12/21/09*)
- Guest contributor to: *The Weather Channel*'s climate site 'One Degree" (since 9/06); *Seed Magazine* (May 21, 2007; "Play By the Rules, But Be Clever")
- Co-founder and contributor, climate science website, "*RealClimate.org*" (founded 12/04)
- Advisory Board, OurEarth.org (NGO), 2008-
- Science Advisory Council, 1Sky (NGO), 2008-
- Content Committee, Climate Solutions Project, Bowman Group, 2007-

- Advisory Committee, "CLUES" (museum/community partnership of the Franklin Institute Science Museum, Phila PA), 2009-
- Advisor to numerous policy makers, public policy experts, governmental and non-governmental organizations (1999-)

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Non-reviewed Contributions

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- **Mann, M.E.,** Schmidt, G., Communicating Science: Not Just Talking the Talk, *RealClimate.org*, September 2009.
- **Mann, M.E.,** Unscientific America: A Review, *RealClimate.org*, July 2009.
- **Schmidt, G., Mann, M.E.,** Winds of Change, *RealClimate.org*, June 2009.
- **Mann, M.E.,** Play By the Rules, But Be Clever, *Seed Magazine*, May 2009.
- Tschakert, P., **Mann, M.E.,** Wagener, T., *Climate Risk Management and Adaptation Strategies in the Developing World,* White Paper for NOAA's Office of Oceanic and Atmospheric Research Climate Program Office, May 2009.
- **Mann, M.E.,** Communicating the Science of Climate Change, *RealClimate.org*, January 2009.
- **Mann, M.E.,** Schmidt, G., Not the IPCC ("NIPCC") Report, *RealClimate.org*, November, 2008.
- Benestad, R., **Mann, M.E.,** Climate Change and Tropical Cyclones (Yet Again), *RealClimate.org*, May 2008
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- **Mann, M.E.,** Worth a Look, *RealClimate.org*, September, 2007
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- Schmidt, G., **Mann, M.,** Archer, D.E., Rahmstorf, S., Connolley, W., Bradley, R., Consensus as the New Heresy, *RealClimate.org*, January, 2007.
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- Schmidt, G., **Mann, M.E.,** Historical Climatology in Greenland, *RealClimate.org*, November 2006.
- Schmidt, G., **Mann, M.E.,** The Trouble with Sunspots, *RealClimate.org*, September 2006.
- **Mann, M.E.,** Schmidt, G., Tropical SSTs: Natural Variations or Global Warming, *RealClimate.org*, September 2006.
- **Mann, M.E.,** Schmidt, G., Fact, Fiction, and Friction in the Hurricane Debate, *RealClimate.org*, August 2006.
- **Mann, M.E.,** Jones, P.D., More on the Arctic, *RealClimate.org*, May 2006.
- **Mann, M.E.,** A New Take on an Old Millennium, *RealClimate.org*, February 2006.
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- **Mann, M.E.,** The False Objectivity of Balance, *RealClimate.org*, November 2005.
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- **Mann, M.E.,** Schmidt, G., Peer Review: A Necessary but not Sufficient Condition II, *RealClimate.org*, January 2005.
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- **Mann, M.E.,** Rahmstorf, S., Schmidt, G., Steig, E., Connolley, W., Senator Inhofe on Climate Change, *RealClimate.org*, January 2005.
- **Mann, M.E.,** On yet Another False Claim by McIntyre and McKitrick, *RealClimate.org*, January 2005.
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- **Mann, M.E.,** Schmidt, G., Climate Change Disinformation, *RealClimate.org*, December 2004.
- **Mann, M.E.,** Weren't temperatures warmer than today during the "Medieval Warm Period"? *RealClimate.org*, December 2004.
- **Mann, M.E.,** OK, But we Know it was Warmer than Present 6000 Years Ago, Don't We? *RealClimate.org*, December 2004.
- **Mann, M.E.,** Temperature Variations in Past Centuries and the so-called "Hockey Stick", *RealClimate.org*, December 2004.
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- **Mann, M.E.,** False Claims by McIntyre and McKitrick regarding the Mann et al (1998) reconstruction, *RealClimate.org*, December 2004.
- **Mann, M.E.,** Paleoclimate Implications for Recent Human Influence on Climate, *International Seminar on Nuclear War and Planetary Emergencies, Nuclear Strategy and Peace Technology*, The Science and Culture Series, edited by A. Zichichi, R. Ragaini, pp. 86-91, 2003.
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- **Mann, M.E.,** Bradley, R.S., Global Climate Variations over the Past 250 Years: Relationships With the Middle East, *Transformations of Middle Eastern Natural Environments: Legacies and Lessons*, Yale School of Forestry and Environmental Studies Bulletin Series, 103, 429-443, 1998.
- **Mann, M.E.,** On Reconstructing Past Centuries' Temperatures, *World Climate Report*, 3, 26, 6-7, 1998.
- **Mann, M.E.,** *A Study of Ocean-Atmosphere Interaction and Low Frequency Variability of the Climate System*, PhD Thesis, 283pp, Yale University, New Haven, CT, 1998.
- **Mann, M.E.,** Bradley, R.S., Hughes, M.K., Multiproxy based reconstructions of large-scale surface temperature patterns during the past several centuries, *Proceedings of the Ninth Symposium on Global Change Studies*, Phoenix, AZ, January 1998.
- Rajagopalan, B., **Mann, M.E.,** Lall,U., Climatic forecasting based on multivariate frequency and time domain-based prediction, *Proceedings of the Eighth Symposium on Global Change Studies*, Long Beach, CA, February 1997.
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- **Mann, M.E.**, Park, J., Globally correlated variability in surface temperatures, *Proceedings of the 6th Conference on Climate Variations*, American Meteorological Society, 297-301, Nashville, TN, January 1994.

Invited Lectures, Workshops, and Panels

- Invited public lecture, "*Dire Predictions: Understanding Global Warming*", Jane Claire Dirks-Edmunds lecture in ecology, Department of Biology, Linfield College, McMinnville, OR, May 11, 2010.
- Invited public lecture, "*The Facts Behind Global Warming*", Pennfuture's Global Warming Conference: "Creating a Climate for Justice", Pittsburgh, PA, May 2, 2010.
- Invited public lecture, "*Dire Predictions: Understanding Global Warming*", *"Current Issues"* series, Foulkeways, Gwynedd, PA, Apr 23, 2010.
- Invited lecture, *Learning About Climate Dynamics Using Paleoclimate Information From Past Centuries*, Eighth Atmospheric Science Symposium, UC Berkeley Atmospheric Sciences Center (BASC), UC Berkeley, Berkeley, CA, Feb 26, 2010.
- Invited lecture, *"Climate Change: What Can We Learn From Past Centuries?"* Dept. of Geography, Penn State University, University Park, PA, Feb 12, 2010.
- Invited presentation, *American Meteorological Society 22nd Conference on Climate Variability and Change*, "Global Signatures of the 'Little Ice Age' and 'Medieval Climate Anomaly' and Plausible Dynamical Origins", Atlanta, GA, Jan 19, 2010.
- Invited presentation, *AGU Fall meeting*: "Global Signatures of the "Little Ice Age" and "Medieval Climate Anomaly" and Plausible Dynamical Origins", San Francisco, CA, Dec 18, 2009.
- Invited presentation, *AGU Fall meeting*: "Communicating Climate Change", San Francisco, CA, Dec 17, 2009.
- Invited presentation, *Conference on Climates and Humans*: "Climate of the past millennium", Cité des Science, Paris, France Nov 21 2009
- Invited presentation, *Geology & Geophysics Alumni Conference:* "Climate Change Insights from the Paleoclimate Record of Past Centuries", Yale University, New Haven, CT, Nov 7, 2009.
- Session introduction, Pardee Keynote Symposium: "Crisis in the Cryosphere", *Geological Society of America (GSA) Joint Annual meeting*, Portland, Oregon, Oct 21, 2009.
- Keynote lecture, "Dire Predictions: Understanding Global Warming", *Stewardship or Sacrifice? Religion & the Ethics of Climate Change*, Penn State University, University Park, PA, Oct 7, 2009.
- Invited presentation, *Plant-Soil Interactions in Future Climates* (17th Penn State Plant Biology Symposium): "Climate Change: The science, projected impacts, and possible solutions", University Park, PA, May 19, 2009.
- Invited participant, "*Ocean on The Edge: Top Ocean Issues*", Aquarium of the Pacific, May 12-14 2009.
- Invited public lecture, "Dire Predictions: Understanding Global Warming", *Virginia Festival of the Book*, Charlottesville, VA, Mar 20, 2009.
- Invited presentation (co-authors R. Bradley, E. Crespin, H. Goosse, M.K. Hugues, S. Rutherford, D. Shindell, Z. Zhang) "Towards Understanding Patterns of Climate Change in Past Centuries", *Joint IPCC-WCRP-IGBP Workshop: New Science Directions and Activities Relevant to the IPCC AR5*, Honolulu, HI, Mar 3, 2009.

- Invited public lecture, "*Dire Predictions: Understanding Global Warming*", ISET NOAA Cooperative Institute, North Carolina A&T university, Greensboro, NC, Feb 24, 2009.
- Invited presentation, *AGU Fall meeting*: "Fighting A Strong Headwind: Challenges in Communicating the Science of Climate Change", San Francisco, CA, Dec 16, 2008.
- Invited presentation (co-authors R. Bradley, E. Crespin, H. Goosse, M.K. Hugues, S. Rutherford, D. Shindell, Z. Zhang), *AGU Fall meeting*: "Towards Understanding Patterns of Climate Change in Past Centuries", San Francisco, CA, Dec 16, 2008.
- Invited presentation, *Conference on New Methodologies and Interdisciplinary Approaches in Global Change Research* (European Science Foundation): "Climate Change: Past and Future", Porquerolles, France, Nov 7, 2008.
- Invited presentation, *Geological Society of America (GSA) Joint Annual meeting*: "Global Climate Change: The Science, Likely Impacts, and Possible Solutions", Houston, TX, Oct 7, 2008.
- Invited lecture, "*Projections of Future Climate Change*", CIDD Seminar Series, Huck Institutes of the Life Sciences, Penn State University, PA, Sep 26, 2008.
- Invited public lecture, "*Dire Predictions: Understanding Global Warming*", 2008 Honors Colloquium, University of Rhode Island, RI, Sep 23, 2008.
- Invited public lecture, "*The Science of Climate Change*", Bruce Museum, Greenwich, CT, Sep 21, 2008.
- Invited participant, *Workshop* on *Tree Rings and Modeling of Asian Monsoon Climate Dynamics, Lamont Doherty Earth Observatory/Columbia University,* Palisades, NY, Sep 10-11, 2008.
- Invited guest lecture, *Summer Institute on Hydrological Change During the Colonial Era, Massachusetts Institute of Technology*, Jul 3, 2008.
- Invited guest lecture, Elderhostel course on *Future of Technology*, Penn State University, State College, PA, Jun 26 2008.
- Invited panelist, *Liberty and Environmentalism*, Orlando FL, The Liberty Fund, Jun 19-21, 2008.
- Invited lecture, "*Climate Change: The Science, The Likely Impacts, and Possible Solutions*", Winton Lecture Series, Winton Group, Oxford, UK, Jun 13 2008.
- Invited presentation, *Workshop on Reducing and Representing Uncertainties in High-Resolution Proxy Data*: "Impacts of Proxy Uncertainties on Multiproxy Reconstructions", International Center for Theoretical Physics (ITCP), Trieste, Italy, Jun 9, 2008.
- Invited lecture, "*The Past and Future of Global Warming*", Penn State University, Brandywine Campus, Media, PA, Apr 25, 2008.
- Invited presentation, *Workshop on Reconciling ENSO Chronologies for the Past 500 Years*: "The Importance of Dynamical Responses to Forcing in Understanding Climate Changes Over the Past Millennium", Moorea, French Polynesia, Apr 3, 2008.
- Invited lecture, "*Paleoclimate reconstructions over the past millennium and how can they inform our understanding of climate dynamics*", Institut d'Astronomie et de Géophysique, Université Catholique de Louvain, Louvain la Neuve, Belgium, Mar 12, 2008.
- Invited lecture, "*The Importance of Dynamical Responses to Forcing in Understanding Climate Changes Over the Past Millennium*", Centre for Global Change Science Seminar Series, University of Toronto, Toronto, Canada, Feb 26, 2008.
- Invited public lecture, "*Global Climate Change: The Predictions, The Likely Impacts, and Possible Solutions*", Le Moyne College, NY, Jan 31, 2008.
- Invited lecture, "*The Physics of Climate Change*", Department of Physics, Penn State University, PA, Jan 17, 2008.
- Invited exhibition, "*Climate change adaptation in Africa*", 3th Conference of the Parties to the UN Framework Convention on Climate Change, Bali, CCLONG project members (M. Mann one of project members), Bali, Indonesia, Dec 3, 2007.
- Invited public lecture, "*Climate Change: Is it for Real and What Does it Mean for You*", Penns Valley Conservation Association, Spring Mills, PA, Nov 14, 2007.

- Invited lecture, "*Climate Change What can the Past tell us about the Future?*", Department of Geological Sciences, University of North Carolina, Chapel Hill, NC, Nov 9, 2007.
- Invited public lecture, "*Global Climate Change: The impacts, the urgency, and likely consequences to humanity*", Annual Carolina Climate Change Seminar Series, Institute for the Environment, University of North Carolina, Chapel Hill, NC, Nov 8, 2007.
- Invited lecture, "*Paleoclimate reconstructions over the past millennium and how they can inform our understanding of climate dynamics*", Ocean and Climate Physics Seminar Series, Lamont Doherty Earth Observatory/Columbia Univ., Palisades, NY, Nov 2, 2007.
- Invited public lecture, *Global Warming and its likely societal impacts*, Environmental Studies Speaker Series, Alfred University, Alfred, NY, Oct 26, 2007.
- Invited lecture, "*The Importance of Dynamical Responses to Forcing in Understanding Climate Changes in Past Centuries*", NOAA/NCEP/NWS/CPC, Camp Springs, MD, Oct 12 2007.
- Invited public lecture, *"Global Climate Change: Past and Future"*, Cornell University, Ithaca, NY, Sep 28, 2007.
- Invited public lecture, "*The Science of Climate Change*", 'EarthTalks' Seminar Series, Earth and Environmental Systems Institute, Penn State University, University Park, PA, Sep 17, 2007.
- Invited public lecture, *"Global Climate Change: Past and Future"*, Straub Environmental Lecture Series, Salem, OR, May 31, 2007.
- Invited lecture, *"The Scientific Cause for Climate Change and its Causation"*, Foster Hewitt lecture, Lehigh University, Lehigh, PA, Apr 6, 2007.
- Invited lecture, *"Modern Climate Trends in the Context of the Late Holocene"*, University of Southern California, Los Angeles, CA, Mar 26, 2007.
- Invited public lecture, "*The Past and Future of Global Warming*", Sierra Club Moshannon Group, State College, PA, Mar 6, 2007.
- Invited lecture, *"Global Climate Change: Past and Future"*, Environmental Protection Agency (Region III Office), Philadelphia, PA, Feb 23, 2007.
- Invited public lecture (w/ D. Easterling, L. Thompson, B. Santer), "*Multiple Lines of Evidence: The Scientific Case for Global Warming and its Causation*", American Meteorological Society's Environmental Science Seminar Series, Washington, DC, Jan 31, 2007.
- Invited presentation, *CLIVAR Meeting on Multidecadal to Centennial Global Climate Variability*: "The AMO Signal in Proxy and Instrumental Observations", Honolulu, Hawaii, Nov 15, 2006.
- Invited presentation, *XIII Venezuelan Geophysical Congress*: "Climate Change: Past and Future", Honolulu, Hawaii, Oct 23, 2006.
- Invited public lecture, "*Global Climate Change: Past and Future*", Pennsylvania Consortium for Interdisciplinary Environmental Policy, Harrisburg, PA, Oct 5, 2006.
- Invited lecture, *The Atlantic Multidecadal Oscillation, Climate Change, and Atlantic Hurricanes*, Dept. of Geography, Penn State University, University Park, PA, Sep 25, 2006.
- Invited lecture, *"Global Climate Change: Past and Future"*, 3M Corporation, Saint Paul, MN, Aug 3, 2006.
- Invited presentation, *HOLIVAR open science meeting*: "Climate over the Past Two Millennia", London, England, Jun 14, 2006.
- Invited presentation, *Workshop on Past Millennia Climate Variability: Proxy based reconstructions, modeling and methodology Synthesis and Outlook*: "Climate over the Past Millennium", Wengen, Switzerland, Jun 8, 2006.
- Invited public lecture, *"Global Climate Change: Past and Future"*, UC Santa Cruz, Santa Cruz, CA, May 10, 2006.
- Invited lecture, *"Climate over the Past Millennium"*, Earth Sciences Department, UC Santa Cruz, Santa Cruz, CA, May 9, 2006.
- Invited lecture, *"Climate over the Past Millennium"*, UC Irvine, Irvine, CA, May 3, 2006.
- Invited lecture, *"Large-scale Climate Influences on Drought: Past, Present, and Future"*, Water Resources Engineering group, Penn State University, State College, PA, Apr 21, 2006.

- Invited public lecture, *"Global Climate Change: Past and Future"*, Margolin lecture in environmental affairs, Middlebury College, Middlebury VT, Mar 7, 2006.
- Invited lecture, *"Climate over the Past Millennium"*, Middlebury College, Middlebury, VT, Mar 6, 2006.
- Invited presentation, *"Climate over the Past 1-2 Millennia"*, U.S. National Academy of Sciences, Washington DC, Mar 3, 2006
- Invited lecture, *"Climate over the Past Millennium"*, Princeton Plasma Physics Laboratory, Princeton, NJ, Feb 20, 2006.
- Invited public lecture, *"Global Climate Change: Past and Future"*, Le Moyne college, Syracuse, NY, Feb 3, 2006.
- Invited lecture "*Climate over the Past Millennium*", Natural Science Seminar Series, Le Moyne college, Syracuse, NY, Feb 3, 2006.
- Invited lecture, *"Detecting Human Induced Climate Change: Insights from the Paleoclimate Record"*, University of New Mexico, Dept. of Physics and Astronomy, Albuquerque, NM, Oct 8, 2005.
- Invited presentation, *Past Global Changes ("PAGES") 2nd Open Science Meeting*: "Insights from Comparing Empirically-estimated and Modeled Climate Change in Past Centuries", Beijing, China, Aug 10, 2005.
- Invited participant, *Past Global Changes ("PAGES") 2nd Open Science Meeting*, Panel Discussion on "Temperature history of the last 2000 years – what do we know?", Beijing China, Aug 10, 2005.
- Invited presentation, 9th International Association of Meteorology and Atmospheric Sciences (IAMAS) Scientific Assembly: "Dynamical Mechanisms of Solar Climate Forcing in Past Centuries", Beijing China, Aug 10, 2005.
- Invited presentation, 9th International Association of Meteorology and Atmospheric Sciences (IAMAS) Scientific Assembly: "Insights from Comparing Empirically-Estimated and Modeled Climate Change in Past Centuries", Beijing China, Aug 5, 2005.
- Invited presentation, Workshop *on Solar Variability and Planetary Climates*: "Comparisons of model simulations and proxy-based climate reconstructions over the past two millennia", International Space Science Institute (ISSI), Bern, Switzerland, Jun 6, 2005.
- Invited participant, *Workshop on Science Communications and the Media*, Lamont Doherty Earth Observatory/Columbia University, Palisades, NY, Jun 1-3, 2005.
- Invited presentation, *Symposium on Energy for the 21st Century*: "Climate Change and Global Warming", Amherst, MA, Apr 9, 2005.
- Invited lecture, Blue Ridge Community College, Harrisonburg, VA, Apr 5, 2005.
- Invited lecture, Pennsylvania State University, Dept. of Geosciences, State College, PA, Mar 29, 2005.
- Invited lecture, Spring meeting of the American Statistical Association, Philadelphia Chapter (ASAP), Philadelphia, PA, Mar 24, 2005.
- Invited lecture, Purdue University, Dept. of Earth & Atmospheric Sciences, West Lafayette, IN, Mar 3, 2005.
- Invited presentation, *Symposium on Whole Earth Systems* (honoring Stephen Schneider): "Climate over the Past Millennium Or So", Palo Alto, CA, Feb 10, 2005.
- Invited presentation, *Meeting on Decadal Variability in the Sun and Climate*, Solar Radiation and Climate Experiment (SORCE) annual meeting, Oct 28, 2004.
- Invited presentation, *Workshop on Historical Reconstruction of Climate Variability in Mediterranean Regions*, Bologna, Italy, Oct 6, 2004.
- Invited lecture, University of Arizona, Atmospheric Sciences Department, Tucson, AZ, Jul 1, 2004.
- Invited presentation, *First International CLIVAR Science Conference*: "Comparisons of Observed Paleoclimate and Model-Based Studies of Climate Changes Over the Past Two Millennia" (co-author: K. Briffa), Baltimore, MD, Jun 23, 2004.
- Invited lecture, Ohio State University, Geology Department, Columbus, OH, May 6, 2004.

- Invited lecture, Ohio State University, Physics Department, Columbus, OH, May 4, 2004.
- Invited presentation, *EGU Spring meeting*: "Volcanic and Solar Forcing of El Nino Over the Past 1000 Years" (co-authors: M.A. Cane, S. E. Zebiak, A. Clement), Nice, France, Apr 27, 2004.
- Invited lecture, University of North Carolina, Carolina Environmental Program (CEP), Chapel Hill, NC, Apr 16, 2004.
- Invited presentation, *Meeting on Tree Rings and Climate*, Tucson, AZ, Apr 6, 2004.
- Invited presentation, *GSA Northeastern Section meeting*, McLean, VA, Mar 27, 2004.
- Invited lecture, Pennsylvania State University, Dept. of Meteorology, State College, PA, Mar 4, 2004.
- Invited presentation, *NASA/CLIVAR/IPRC workshop on Decadal Climate Variability*, Kona, Hawaii, Feb 23, 2004.
- Invited presentation (co-authors B. Adams, C. Ammann, R. Miller, S. Rutherford, G. Schmidt, D. Shindell), *AGU Fall meeting*: "Spatially- and seasonally-specific responses to forcing as detected in paleoclimate reconstructions of past centuries", San Francisco, CA, Dec 12, 2003.
- Invited presentation, 30th session of the *International Seminars on Planetary Emergencies*, World Federation of Scientists, Erice, Italy, Aug 20, 2003.
- Invited presentation, *AGU/EGS Joint Spring meeting*: "Ground vs. Surface Temperature Trends: Implications for Borehole Surface Temperature Reconstructions" (co-author: G. Schmidt), Nice, France, Apr 10, 2003.
- 'Vetlesen' distinguished lecturer, Graduate School of Oceanography, University of Rhode Island, Narragansett, Rhode Island, Mar 5, 2003.
- Invited presentation (co-authors G. Schmidt, D. Shindell), *AGU Fall meeting*: "Climate Changes during the Past Millennium", San Francisco, CA, Dec 8, 2002.
- Invited lecture, Geophysical Fluid Dynamics Laboratory, Princeton, NJ, Oct, 17, 2002.
- Invited lecture, Goddard Institute for Space Studies, New York, NY, Oct 10, 2002
- Invited presentation, Chapman conference on *Volcanism and the Earth's Atmosphere*, Santorini Greece, Jun 20, 2002.
- Invited lecture, University of Copenhagen, Copenhagen, Denmark, Jun 11, 2002.
- Invited presentation, *EGS Spring meeting*: "Climate Change and Forcing over the Past 500 years" (co-authors: S. Rutherford, R. Bradley, M. Hughes), Nice, France, Apr 23, 2002.
- Invited participant, Waxter Environmental Forum, Sweet Briar College, Mar 14, 2002.
- Invited lecture, College of Marine Science, University of South Florida, Mar 8, 2002.
- Invited lecture, Center for Coastal Physical Oceanography (CCPO), Old Dominion University, Feb 18, 2002.
- Invited lecture, INSTAAR, University of Colorado, Jan 28, 2002.
- Invited lecture, Department of Geological Sciences, University of Colorado, Jan 25, 2002.
- Invited lecture, Department of Geology, University of North Carolina, Jan 18, 2002.
- Invited presentation, *AGU Fall meeting*: "Climate Reconstruction using Pseudoproxies", San Francisco, CA, December 11, 2001.
- Invited lecture, Department of Earth & Ocean Sciences, Duke University, Nov 29, 2001.
- Session introduction, Invited session on "Climate Change Detection/Attribution", National Academy of Sciences *Frontiers of Science* annual symposium, Irvine, California, Nov 9, 2001.
- Invited lecture, *Richard Foster Flint Symposium Honoring the Memory of Barry Saltzman,* Nov 3, 2001.
- Invited lecture, DCESS, University of Copenhagen, Copenhagen, Denmark, Aug 13, 2001.
- Invited presentation, *Global Change Open Science Conference*: "Variability in El Nino and the Global ENSO Phenomenon in Past Centuries", Amsterdam, Netherlands, Jul 11, 2001.
- Invited lecture, Courant Institute, New York University, New York, NY, Apr 4, 2001.
- Invited presentation, *EGS Spring meeting*: "Comparison of Large-Scale Proxy-Based Temperature Reconstructions over the Past Few Centuries" (co-authors: S. Rutherford, T. Osborn), Nice, France, March 29, 2001.

- Invited lecture, Turner Lecture Series, Department of Geological Sciences, University of Michigan, Ann Arbor, MI, Mar 16, 2001.
- Invited presentation, *NASA/CLIVAR/IPRC workshop on Decadal Climate Variability*, Honolulu, Hawaii, Jan 8, 2001.
- Invited presentation, *AGU Fall meeting*: "Use of Proxy Climate Data in Climate Change Detection", San Francisco, CA, Dec 16, 2000.
- Invited presentation, *CLIVAR Decadal Climate Predictability Workshop*, La Jolla, California, Oct 4, 2000.
- Invited presentation, 5th *EPA NHEERL symposium on Indicators in Health and Ecological Risk Assessment*, Jun 7, 2000.
- Invited presentation, AMQUA annual meeting, Fayetteville Arkansas, May 22, 2000.
- Invited presentation, *EGS Spring meeting*: "Seasonal Proxy-Reconstructed Surface Temperature Patterns in Past Centuries", Nice, France, Apr 22, 2000
- Invited public lecture, Smithsonian Environmental Research Center (SERC), Edgewater Maryland, Mar 15, 2000.
- Invited participant and speaker, workshop on *El Niño: Past Present and Future*, Seabrook Island South Carolina, Feb 28-Mar 2, 2000.
- Invited guest introductions, *US Global Change Research Program Seminar Series*, Dirksen Senate Office Building, Capitol Hill, Washington DC, Nov 23, 1999.
- Invited participant and speaker, *PAGES/CLIVAR workshop on Climate of the Last Millennium*, Venice Italy, Nov 8 - 12, 1999
- Invited lecture, Geophysical Fluid Dynamics Laboratory, Princeton, NJ, Oct, 21, 1999.
- Invited lecture, NASA Goddard Institute for Space Studies, New York, NY, Oct 15, 1999.
- Invited lecture, Colloquium on Regional Modeling and Detection, International Center for Theoretical Physics (ICTP), Trieste, Italy, Jun 9, 1999.
- Invited presentation, *US Global Change Research Program Seminar Series*, Dirksen Senate Office Building, Capitol Hill, Washington DC, May 17, 1999.
- Invited lecture, Physical Oceanography Seminar Series, Woods Hole Oceanographic Institute, Woods Hole, MA, Mar 2, 1999.
- Invited lecture, Department of Environmental Sciences, University of Virginia, Charlottesville, VA, Feb 18, 1999.
- Invited lecture, School of Marine and Atmospheric Science, University of Miami, Coral Gables, FL, Nov 13, 1998.
- Invited lecture, Department of Mathematics & Statistics, University of Massachusetts, Amherst, MA, Nov 2, 1998.
- Invited presentation, *NASA workshop on Decadal Climate Variability*, Williamsburg, VA, Sep 22-25, 1998
- Invited presentation, *US Global Change Research Program Seminar Series*, Dirksen Senate Office Building, Capitol Hill, Washington DC, Jul 20, 1998
- Invited presentation, *AGU Spring meeting*: "Low-frequency Variations in Midwestern U.S Precipitation: Diagnosing ENSO and Anthropogenic effects", Boston, MA, May 1998
- Invited lecture, NOAA-CDC/ERL/CIRES, Boulder, Colorado, May 13, 1998
- Invited lecture, Graduate School of Oceanography, University of Rhode Island, Narragansett, Rhode Island, Mar 6, 1998
- Invited lecture, Oceanography Department, Texas A&M university, College Station, Texas, Dec 4, 1997
- Invited lecture, Geology Department, West Virginia University, Morgantown, West Virginia, Nov 14, 1997
- Invited talk, conference on *Transformations of Middle Eastern Natural Environments: Legacies and Lessons*, Council on Middle East Studies, Yale Center for International and Area Studies, Yale University, New Haven, Oct 30-Nov 1, 1997

- Invited lecture, Hadley Centre of the United Kingdom Meteorological office, Bracknell, UK, Oct 14, 1997
- Invited presentation, *The Cross-Validation of Proxy Climate Data and the Instrumental Record*, Joint Institute for the Study of Atmosphere and Ocean, University of Washington, Seattle, Jun 23-25, 1997
- Invited lecture, Geophysical Fluid Dynamics Laboratory, Princeton University, Princeton, New Jersey, Mar 4, 1997
- Invited lecture, Department of Atmospheric Sciences, University of California Los Angeles, Feb 14, 1997
- Invited presentation, *SST reconstruction from Proxy data and Optimal Network Design Strategy For Corals and other Annual Records from Tropical Systems (ARTS)* , Lamont Doherty Earth Observatory, Columbia University, Jan 15-16, 1997
- Invited lecture, Lamont Doherty Earth Observatory, Columbia University, Dec 4, 1996
- Invited lecture, Department of Physics, University of Bern, Bern Switzerland, Oct 26, 1996
- Invited presentation, *Links between Variations in Solar Activity, Atmospheric Conductivity, and Clouds: An Informal Workshop*, Los Alamos National Laboratory, Los Alamos, New Mexico, Jun 20-21, 1996
- Invited participant, *Application of Statistics to Modeling the Earth's Climate System*, National Center for Atmospheric Research, Boulder, Colorado. Jul 6-19, 1994
- Invited lecture, United States Geological Survey, *USGS Global Change seminar series*, Reston Virginia, Apr 12, 1993
- Invited lecture, Geology Dept., Brown University, Providence, Rhode Island, Mar 10, 1993
- Invited lecture, Dept. of Chemistry, University of Utah, Jul 14, 1989

Abstracts and Talks

- Fan, F., **Mann, M.E.**, Lee, S., Observed and Modeled Changes in the South Asian Summer Monsoon over the Historical Period, AGU Fall meeting, San Francisco, CA, December, 2009
- Sriver, R.L., **Mann, M.E.**, Goes, M.P., Keller, K., Climate Response to Tropical Cyclone-Induced Ocean Mixing in an Earth System Model of Intermediate Complexity, AGU Fall meeting, San Francisco, CA, December, 2009
- Emile-Geay, J., Cobb, K.M., **Mann, M.E.**, Rutherford, S.D., Wittenberg, A.T., Low-Frequency Tropical Pacific Sea-Surface Temperature over the Past Millennium: Reconstruction and Error Estimates, AGU Fall meeting, San Francisco, CA, December, 2009
- **Mann, M.E.**, Woodruff, J.D., Donnelly, J., Zhang, Z., El Nino, tropical Atlantic warmth, and Atlantic hurricanes during the past 1500 years, 2nd International Summit on Hurricanes and Climate Change, Corfu, Greece, June 2009.
- Goosse, H., Crespin, E., **Mann, M.E.**, Renssen, H., Timmermann, A., A dynamically consistent reconstruction of surface temperature changes during the last 600 years based on climate model simulations using data assimilation, EGU Spring meeting, Vienna, Austria, April 2009 (solicited).
- Crespin, E., Goosse, H., Fichefet, T., **Mann, M.E.**, Did fluctuations of the thermohaline circulation in the North Atlantic play a role during Arctic warm episodes of the past millennium? EGU Spring meeting, Vienna, Austria, April 2009.
- **Mann, M.E.**, Bradley, R.S., Crespin, E., Goosse, H., Hughes, M.K., Rutherford, S., Shindell, D., Zhang, Z., Towards Understanding Patterns of Climate Change in Past Centuries, EGU Spring meeting, Vienna, Austria, April 2009.
- Crespin, E., Goosse, H., Fichefet, T., **Mann, M.E.**, Potential causes of 15th century Arctic warming using coupled model simulations with data assimilation, EGU Spring meeting, Vienna, Austria, April 2009.
- Katz, B.G., Najjar, R.G., **Mann, M.E.**, Potential impact of changing sea level and streamflow on salinity of the upper Delaware Bay, 3rd Delaware Estuary Science and Environmental Summit, Cape May, NJ, January 2009.

- Sabbatelli, T., **Mann, M.E.**, S.K. Miller, Semi-Empirical Projections of Future Atlantic Tropical Cyclone Activity, 8th Annual AMS Student Conference, Phoenix, AZ, January 2009
- Crespin, E., Goosse, H., Fichefet, T., **Mann, M.E.**, Causes of 15th century warming event in the Arctic in a coupled climate model including data assimilation, AGU Fall meeting, San Francisco, CA, December, 2008
- Emile-Geay, J., Cobb, K.M., **Mann, M.E.**, Rutherford, S., Low-Frequency Tropical Pacific Sea-Surface Temperature over the Past Millennium: Reconstruction and Error Estimates, AGU Fall meeting, San Francisco, CA, December, 2008
- Sabbatelli, T.A., **Mann, M.E.**, Miller, S.K., Evans, J.L., Semi-Empirical Projections of Future Atlantic Tropical Cyclone Activity, AGU Fall meeting, San Francisco, CA, December, 2008
- Crespin, E., Goosse, H., Fichefet, T., **Mann, M.E.**, Simulating the climate of the Arctic during the last millennium in a coupled climate model including data assimilation, EGU General Assembly, Vienna, Austria, April 2008
- Emile-Geay, J.E. , Cobb, K.M., **Mann, M.E.**, Experimental reconstructions of tropical Pacific sea-surface temperature over the past millennium, EGU General Assembly, Vienna, Austria, April 2008
- Steig, E.J., Schneider, D.P., Rutherford, S.D., **Mann, M.E.**, Comiso, J.C., Shindell, D.T., Significant warming of West Antarctica in the last 50 years, EGU General Assembly, Vienna, Austria, April 2008
- Katz, B.G., Najjar, R.G., Cronin, T.M., **Mann, M.E.**, Rayburn, J.A., Duration and magnitude of freshwater floods during the 13 KA and 11.4 KA BP events in the Paleo-Champlain Sea, GSA Northeastern Section, Buffalo, NY, March 2008
- Najjar, R., Graham, S., Hilton, T., Katz, B., Li, M., **Mann, M.**, Patterson, L., Zhong, L., Climate Forcing of Mid-Atlantic Estuaries in the 21st Century, Ocean Sciences Meeting, Orlando, Florida, March 2008
- Crespin, E., Goosse, H., Fichefet, T., **Mann, M.E.**, Simulating the climate of the Arctic during the last millennium in a coupled climate model including data assimilation, 38th International Arctic Workshop, Boulder, CO, March 2008
- **Mann, M.E.**, Fan, F., Zhang, Z, Ammann, C., Shindell, D., Schmidt, G., The Importance of Dynamical Responses to Forcing in Understanding Climate Changes Over the Past Millennium, AGU Fall meeting, San Francisco, CA, December, 2007
- Fan, F., **Mann, M.E.**, Ammann, C., , Changes in the Asian Summer Monsoon over the Past Millennium, AGU Fall meeting, San Francisco, CA, December, 2007
- Goosse, H., **Mann, M.E.**, Renssen, H., Timmerman, A., Data assimilation over the last millennium using a large ensemble of simulations, AGU Fall meeting, San Francisco, CA, December, 2007
- Najjar, R., T. Hilton, B. Katz, L. Zhong, M. Li and **M. Mann**, Is there a signal of sea-level rise in the salinity of mid-Atlantic estuaries. Presentation at the annual meeting of the Estuarine Research Federation, Providence, RI, November 8, 2007.
- Fan, F., **Mann, M.E.**, Ammann, C., Natural Forcing of the Asian Summer Monsoon Over the Past Millennium, 3rd Alexander von Humboldt International Conference on The East Asian Monsoon, past, present, Beijing China, August, 2007
- Goosse, H., **Mann, M.E.**, Renssen, H., Timmerman, A., Reconstructing temperature changes over the past millennium using both model results and observations, Second International Conference on Earth System Modelling, Hamburg Germany, August, 2007
- **Mann, M.E.**, Zhang, Z, Rutherford, S., Bradley, R., Hughes, M., Proxy-based Reconstructions of Past Hemispheric and Global Mean Surface Temperature Variations, *IUGG* 24th General assembly, Perugia, Italy, July, 2007
- **Mann, M.E.**, Zhang, Z, Rutherford, S., Bradley, R., Hughes, M., Proxy-based Reconstructions of Past Hemispheric and Global Mean Surface Temperature, AGU Fall meeting, San Francisco, CA, December, 2006
- Rutherford, S., **Mann, M.E.**, Wahl, E.R., Ammann, C., Test of Climate Field Reconstruction Performance Using Pseudoproxies, AGU Fall meeting, San Francisco, CA, December, 2006

- Emanuel, K., **Mann, M.E.**, Hurricanes and the Atlantic Multidecadal Oscillation, AGU Fall meeting, San Francisco, CA, December, 2006
- Goosse, H., Renssen, H., Timmermann, A, Bradley, R.S., **Mann, M.E.**, Using paleoclimate proxy-data to select optimal realisations in an ensemble of simulations of the climate of the past millennium, EGU Spring meeting, Vienna, Austria, April 2006
- **Mann, M.E.**, Global Warming, the AMO, and North Atlantic Tropical Cyclones, ESSC Brownbag Seminar, Penn State University, University Park, PA, March, 2006.
- Knight, J., Allan, R., Folland, C., Vellinga, M., **Mann, M.**, A Signature of Persistent Natural Thermohaline Circulation Cycles in Observed Climate, AGU Fall meeting, San Francisco, CA, December, 2005 (solicited).
- Cook, B.I., Epstein, H.E., Smith, T.M., **Mann, M.E.**, Arctic Oscillation Induced Warming and Terrestrial Responses, AGU Fall meeting, San Francisco, CA, December, 2005.
- Emile-Geay, J.B., Cane, M.A., **Mann, M.E.**, Seager, R., ENSO response to radiative forcing over the Holocene: a model perspective, AGU Fall meeting, San Francisco, CA, December, 2005.
- Knight, J., Scaife, A., Allan, R., Folland, C., Vellinga, M., **Mann, M.**, The Atlantic Multidecadal Oscillation: a signature of thermohaline circulation cycles in observed climate, IAMAS 9th Scientific Assembly, Beijing, China, August 2005.
- Goosse, H., Renssen, H., Timmermann, A., Bradley, R., **Mann, M.**, Using paleoclimate proxy-data to select an optimal realisation in an ensemble of simulations of the climate of the past millennium, EGU Spring meeting, Vienna, Austria, April 2005 (solicited).
- Graham, N., Ammann, C., Tomas, R., Hoerling, M., Xu, T., Hughes, M., **Mann, M.**, Understanding late Holocene climate transitions in the Pacific: Results from proxy-guided AGCM experiments, EGU Spring meeting, Vienna, Austria, April 2005 (solicited).
- Cook, E.; Herweijer, C.; Seager, R.; **Mann, M.**, Long-term drought variability over North America and its connection to global and tropical Pacific SST forcing, EGU Spring meeting, Vienna, Austria, April 2005.
- Emile-Geay, J., Cane, M., **Mann, M.**, Bond, G., Radiative forcing of El Niño-Southern Oscillation over the Holocene: a model perspective, EGU Spring meeting, Vienna, Austria, April 2005.
- Cook, E., Cane, M., Seager, R., **Mann, M.**, Tropical Pacific Links to Long-Term Aridity Changes in the Western United States, Chapman conference on Tropical-Extratropical Teleconnections, Honolulu, HI, February 2005 (solicited).
- M. Cane, Emile-Geay, J., Seager, R., Clement, A. **Mann, M.**, Solar Influence on ENSO and the Tropics?, AGU Fall meeting, San Francisco, CA, December, 2004 (solicited).
- Cook, B.I., Smith, T.M., **Mann, M.E.**, The North Atlantic Oscillation and Regional Phenology Prediction Over Europe, AGU Fall meeting, San Francisco, CA, December, 2004.
- Steig, E.J., Schneider, D.P., **Mann, M.E.**, Rutherford, S.J., van Ommen, T., Winebrenner, D.P., Antarctic Temperatures since 1856, Western Antarctic Ice Shelf meeting, September 2004.
- Cronin, T.M., Willard, D.A., Thunell, Dwyer, G.S., **Mann, M.E.**, Seanger, C., Climate Variability from Estuarine Sediments: A Case Study of Chesapeake Bay, First International CLIVAR Science Conference, June 2004.
- Jones, P.D., **Mann, M.E.**, "Comparisons of millennial reconstructions of Northern Hemisphere (NH) temperatures from proxy data with coupled-GCM integrations" , EGU Spring meeting, Nice, France, April 2004.
- Luterbacher, J., Xoplaki, E, Fischer, E., Pauling, A., Gonzalez-Rouco, F.J., Garcia Herrera R., Guiot, J., Zorita, E., Jacobeit, J., Mariotti, A., Rimbu, N., Felis, T., Rodrigo F., Barriendos, M., **Mann, M.E.**, Touchan, R., Past mediterranean climate variability – present knowledge and Scientific Challenges For Future Research, EGU Spring meeting, Nice, France, April 2004.
- Saenger, C.P., Cronin, T.M., Thunell, R. Vann, C., Dwyer, G., Seal, R. II, **Mann, M.E.**, Eastern U.S. Holocene Climate Variability from Chesapeake Bay Sediments, Geological Society of America Annual Northeastern Section meeting, March 2004.

- Hughes, M.K., Ni, F., **Mann, M.E.**, Park, J., Global Multidecadal to Century-Scale Climate Oscillations During the Last 1000 Years, AGU Fall meeting, San Francisco, CA, December, 2003.
- Shindell, D.T, Schmidt, G.A., **Mann, M.E.**, Miller, R.L., Northern Hemisphere Regional Climate Change during the Last Millennium, AGU Fall meeting, San Francisco, CA, December, 2003.
- Schmidt, G.A., Shindell, D.T., Miller, R.L., and **Mann, M.E.**, External forcing of climate change during the Holocene, IMAGES Holocene Working Group Meeting, Hafslo, Norway, August 2003.
- **Mann, M.E.**, Rutherford, S., Jones, P.D., Schmidt, G.A., Shindell, D., Climate changes during the past millennium, IUGG Meeting, Sapporo, Japan, July, 2003.
- Knight, R.G., Folland, C.K., Vellinga, M., **Mann, M.E.**, The Atlantic Multidecadal Oscillation and the Thermohaline Circulation: A Global-Scale Ocean-Atmosphere Mode Simulated in a 1400 Year Coupled Model Calculation, IUGG Meeting, Sapporo, Japan, July, 2003.
- Wiberg, P., Cleary, P., **Mann, M.E.**, Coupling wave and meteorological observations with bottom-boundary-layer models to investigate spatial and temporal variability in continental-shelf sediment transport, International Geological Congress, Florence, Italy, June, 2003.
- Knight, R.G., Folland, C.K., Vellinga, M., **Mann, M.E.**, The Atlantic Multidecadal Oscillation and the Thermohaline Circulation: A Global-Scale Ocean-Atmosphere Mode Simulated in a 1400 Year Coupled Model Calculation, Conference of the Royal Meteorological Society, June, 2003.
- D'Arrigo, R.D., Cook, E.R., **Mann, M.E.**, Jacoby, G.C., Tree-ring Reconstructions of Arctic Oscillation Indices Since AD 1650, ARCUS 15th Annual Meeting And Arctic Forum, Arlington, VA, April 2003.
- Shindell, D.T., Schmidt, G.A., Miller, R., **Mann, M.E.**, "Volcanic and Solar Forcing of Global and Regional Climate During the Preindustrial Era" , AGU/EGS Joint Spring meeting, Nice, France, April 2003.
- Zhang, Z., **Mann, M.E.**, Cook, E.R., A Revised Set of Dendroclimatic Reconstructions of Summer Drought over the Conterminous U.S., AGU Fall meeting, San Francisco, CA, December, 2002.
- Rutherford, S., **Mann, M.E.**, Bradley, R., Briffa, K., Hughes, M., Jones, P., Osborn, T., Proxy-Based Reconstruction of Surface Temperature Variations in Past Centuries, AGU Fall meeting, San Francisco, CA, December, 2002.
- Cook, B.I., **Mann, M.E.**, Smith, T., A Statistical Resampling Technique for Conditioning Simulated Daily European Surface Temperatures on the North Atlantic Oscillation Index, AGU Fall meeting, San Francisco, CA, December, 2002.
- Adams, B., Ammann, C.M., **Mann, M.E.**, Using Paleoclimatic Reconstructions of ENSO Variability During the Past Few Centuries to Re-Examine the 'Volcano-ENSO' Hypothesis, AGU Fall meeting, San Francisco, CA, December, 2002.
- Rutherford, S., **Mann, M.E.**, Proxy-Based Reconstructions of Surface Temperature Patterns During the Maunder Minimum, AGU Spring meeting, Washington, DC, May 2002.
- Shindell, D.T., Schmidt, G.A., **Mann, M.E.**, Rind, D, Waple, A., Miller, R., Solar and Volcanic Forcing of Climate Change during the Maunder Minimum, AGU Spring meeting, Washington, DC, May 2002.
- Shindell, D., Schmidt, G., **Mann, M.**, Rind, D., Waple, A., Long-term Solar Forcing of the Arctic Oscillation/North Atlantic Oscillation, AGU Fall meeting, San Francisco, CA, December, 2001.
- Druckenbrod, D.L., **Mann, M.E.**, Stahle, D.W., , Cleaveland, M.K., Therrell, M.D., Shugard, H.H., James Madison and a Shift in Precipitation Seasonality, AGU Fall meeting, San Francisco, CA, December, 2001.
- Cook, E.R., D'Arrigo, R.D., **Mann, M.E.**, A well-verified multiproxy reconstruction of the winter North Atlantic Oscillation index Since AD 1400, U.S CLIVAR Atlantic meeting, Boulder, CO, June 14, 2001
- Brigham-Grette, J., Rittennour, T.M., **Mann, M.E.**, Drainage history of glacial Lake Hitchcock and Paleoclimate Implications of Late Quaternary Sediments and Terraces in the Central Connecticut Valley, New England, GSA Northeastern Section, 36th Annual Meeting, Burlington, VT, March 12, 2001.

- Rutherford, C.M., **Mann, M.E.**, Schneider, T., Delworth, T., Stouffer, R., Climate Field Reconstruction Under Stationary and Non-Stationary Forcing, AGU Fall meeting, San Francisco, CA, December, 2000.
- Rittennour, T.M., Brigham-Grette, J., **Mann, M.E.**, El Nino-like Climate Teleconnections in New England During the Late Pleistocene: Insights from a 4000-year Glacial Varve Chronology, AGU Fall meeting, San Francisco, CA, December, 1999.
- **Mann, M.E.**, Variability in El Nino And the Global ENSO Phenomenon in Past Centuries, AGU Fall meeting, San Francisco, CA, December, 1999.
- Ammann, C.M., **Mann, M.E.**, Bradley, R.S., Explosive Volcanism and ENSO: Search for a Relationship in a Multi-century Global Climate Reconstruction, AGU Fall meeting, San Francisco, CA, December, 1999.
- Waple, A.M., **Mann, M.E.**, Bradley, R.S., Proxy and model-based analysis of patterns of temperature associated with solar irradiance over the last several centuries, *IUGG* annual meeting, Birmingham, UK July, 1999.
- D'Arrigo, R., Cook, E., Cullen, H., **Mann, M.E.**, Reconstructions of North Atlantic Oscillation Indices, *IUGG* annual meeting, Birmingham, UK, July, 1999.
- Folland, C.K., Allan, R.J., **Mann, M.E.**, Power, S.B., Patterns of large-scale climatic variability in the instrumental era, *IUGG* annual meeting, Birmingham, UK, July, 1999.
- **Mann, M.E.**, Northern Hemisphere temperatures during the past millennium, *Annales Geophysicae, Supplement II*, EGS, 17, Den Haag, Netherlands, April 1999.
- Waple, A.M., **Mann, M.E.**, Bradley, R.S., Proxy and Model-Based Analysis of Patterns of Temperature Associated with Solar Irradiance From 1650 to 1850, AGU Fall meeting, San Francisco, CA, December, 1998.
- Lall, U., Rajagopalan, B., **Mann, M.**, Cook, E., Explaining Upper Mississippi River Droughts and Wet Spells in Terms of Hemispheric Changes in Atmospheric Circulation, *GCIP* conference, St Louis, Mississippi, June, 1998.
- Jain, S., Lall, U., **Mann, M.**, Rajagopalan, B., Interannual to Secular Trends in Midwestern Precipitation: Insights on Greenhouse Gas and ENSO Forcing from a Coupled Ocean-Atmosphere Model, *GCIP* conference, St Louis, Mississippi, June, 1998.
- Jain, S., Lall, U., **Mann, M.E.**, Rajagopalan, B., Changes in the Midwestern U.S. Precipitation: Observations and Modeled Greenhouse Warming Scenarios, *7th International Meeting on Statistical Climatology*, Whistler, BC, May, 1998.
- Park, J, **Mann, M.E.**, ENSO Episodes and Shifts in Global Temperature: A Wavelet Correlation Approach, AGU Fall meeting, San Francisco, CA, December 1997.
- **Mann, M.E.**, Bradley, R.S., Hughes, M.K, Northern Hemisphere Temperature During the Past Half-Millenium: Implications for External Forcing and Natural Variability of the Climate, AGU Fall meeting, San Francisco, CA, December, 1997.
- **Mann, M.E.**, Multi-Proxy based reconstructions of large-scale surface temperature patterns during the past several centuries, AGU Spring meeting, Baltimore MD, May 1997.
- Jain, S., Lall, U., **Mann, M.E.**, Trends in N. Hemisphere Surface Temperature Gradients (Equator-to-Pole and Land-Ocean Contrast):Volcanic Effects and Secular Variations, AGU Fall meeting, San Francisco, CA, December 1996.
- **Mann, M.E.**, A comparison of Observed and Modeled Climate Variability on Interdecadal and Century Timescales, AGU Fall meeting, San Francisco, CA December 1996.
- **Mann, M.E.**, Bradley, R.S., The detection of spatiotemporal signals in long-term proxy climate data: prospects for improved climate model validation, *Workshop on High Resolution Climate Modeling*, Wengen, Switzerland, September 23-26, 1996.
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Climate Change: what do we know about the IPCC?

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Abstract

This is the first of a series of three biennial reviews of research on the subject of climate change. This review is concerned with the UN Intergovernmental Panel on Climate Change (IPCC): its origins and mandate; its disciplinary and geographical expertise; its governance and organisational learning; consensus and its representation of uncertainty; and its wider impact and influence on knowledge production, public discourse and policy development. The research that has been conducted on the IPCC as an institution has come mostly from science and technology studies scholars and a small number critical social scientists. The IPCC's influence on the construction, mobilisation and consumption of climate change knowledge is considerable. The review therefore ends by encouraging geographers of science to turn their research and scholarship to understanding the roles played by the IPCC, and equivalent institutional processes of climate change knowledge assessment, in the contemporary world.

Key Words

Climate change IPCC Uncertainty Consensus Science governance Learning

Introduction

It is over a decade since I wrote the last of my annual review articles for *Progress in Physical Geography* (Hulme, 2000). The subject of the eight reviews I wrote during the 1990s was 'global warming'. The subject of these new biennial reviews is to be 'climate change', the change of nomenclature reflecting an interesting change of perspective and framing. The significance of language in social discourse, public perceptions and policy framing of climate change has recently been explored, respectively, by Nerlich *et al.*, (2010), Whitmarsh (2009) and Nisbet (2009).

The subject of the first of these new reviews for *Progress in Physical Geography* is the United Nations Intergovernmental Panel on Climate Change (IPCC). The institution received, jointly, the 2007 Nobel Peace Prize for 'its effort to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for the measures that are needed to counteract such change'. Yet during 2010 the IPCC has come under unparalleled public and political scrutiny (Bagla, 2010; Schiermeier, 2010). It is therefore timely to survey the scope and depth of academic research into the nature of this institution – its origins and mandate; its mobilisation of expertise; its governance; its representation of uncertain knowledge; and its impact and influence. I am also partly inspired to this task by the 'spatial turn' in the history and philosophy of science (e.g. Shapin, 1998; Livingstone, 2007; Finnegan, 2008): space matters in the making and mobilising of knowledge. The literature reviewed here comes mainly from science and technology studies, policy studies, political science, environmental sociology, philosophy of science and from a few areas of academic geography.

Origins and Mandate

Two large-scale experiments are being conducted in the world today in relation to climate change. One of these was famously described by the American geophysicist Roger Revelle in the 1950s: 'Human beings are now carrying out a large-scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future' (Revelle & Suess, 1957: 19). The other experiment is also one which has not before been attempted. It is a worldwide socio-cultural experiment to see whether the whole panoply of human behaviours, preferences and practices can be directed towards achieving one over-arching

goal: to change the terms of Revelle's experiment by bringing the worldwide emissions of greenhouse gases under directed management. We do not know the outcome of either experiment, but what connects them together is predictive knowledge ... putative knowledge about how future climate may evolve over decades to centuries. Central to the assessment, validation and mobilisation of such knowledge claims about climate change has been the IPCC.

The IPCC was officially constituted during its first meeting in Geneva in November 1988 (IPCC, 1988). The scientific and diplomatic politics surrounding the formation of this new institutional process of knowledge assessment in the late 1980s have been described and analysed by Hecht and Tirpak (1995), Franz (1997), Agrawala (1998a,b), Skodvin (2000a) and, in a rather more personal and anecdotal manner, by Bolin (2007). Yet, other forms of institutional processes for bringing climate change knowledge to bear on the international policy process could have emerged at the time. For example, the World Meteorological Organisation, the United Nations Environment Programme (UNEP) and the International Council for Scientific Unions could each have ended up with the responsibility for such a knowledge assessment, as for a while did the Advisory Group on Greenhouse Gases whose origins and functions were strongly influenced by non-governmental organisations. As Agrawala (1999) argues, the emergence in the late 1980s of the IPCC as the politically favoured means of climate change knowledge assessment owed much to American unease about UNEP and to their desire to find a means of balancing the advocacy positions of the fossil fuel and environmentalist lobbies in the USA.

More critical readings of the emergence of the IPCC have also been offered. Boehmer-Christiansen (1994a,b,c) argued that establishing the IPCC as a 'single established source' of information about climate change suited a convergence of scientific, political and some business interests. She pointed to dangers for scientific practice and scientific institutions from scientists being used to feed this new politically charged activity. Shackley and Skodvin (1995) offered a measured response to Boehmer-Christiansen (others have been less forgiving), arguing that such a 'conspiratorial' account of the emergence of the IPCC was too simplistic. Yes, interests were being mobilised for all sorts of reasons and certain voices being privileged over others, but such a complex process of institution building could not be reduced to science exerting its hegemony over policy or a cabal of scientists seeking means to secure their own further funding.

Shackley and Skodvin therefore advocated an expanded role for interpretative social scientists in understanding the internal and external dynamics that led to the construction of the IPCC and in scrutinising the types of knowledge it produced - which is what Elzinga (1996), Demeritt (2001) and Miller (2004; 2007), for example, later produced. Miller approached the origins of the IPCC from a more analytical and much wider historical perspective than Boehmer-Christiansen, drawing upon social studies of science to inform his analysis. Using Sheila Jasanoff's idiom of co-production (Jasanoff, 2004), Miller showed how many things converged in the late 1980s to allow a fruitful space within which a body such as the IPCC could emerge: the loss of cultural and social readings of climate and the re-framing of climate as 'global'; the rising power of climate modeling and Earth system science; the rise of global environmental politics during the 1980s; the politics surrounding the end of the Cold War; and a new 'green' imperialism in European societies.

In a short 1997 commentary, Simon Shackley asked four pertinent questions about the status and future of the IPCC. To paraphrase them: Can the IPCC involve more scientists from developing countries? Will it preserve its authority as a trusted expert body? Can it avoid its open processes becoming hostage to endless political negotiation? Will the IPCC define a clear role for itself, sufficiently distinct from the policy process itself? Shackley concluded his commentary by noting: "Of particular concern is whether the IPCC can make its knowledge more socially relevant and trusted by bridging the gulf which exists between scientific experts and on-the-ground decision-makers and members of the public" (Shackley, 1997: 174). These questions relating to participation, trust, governance and policy advocacy remain as critical today as they did then. The rest of this review will summarise research that has been completed since Shackley asked these questions and help point towards some possible answers.

Expertise and Participation

The two main questions that research in this area has sought to address are: what forms of disciplinary expertise are enlisted in IPCC assessments, and what are the geographical biases in the recruitment of expert authors and reviewers?

With respect to the first of these questions, Bjurström and Polk (2010) have conducted the most thorough analysis to date of the disciplinary biases in the knowledge assessed by the IPCC. They categorised the 14,000 references cited in the IPCC Third Assessment Report (2001) into different disciplines. Of these references, 62 per cent were to peer-reviewed journals (38 per cent referred to books, conference proceedings and grey literature). Of this peer-reviewed sub-set, just 12 per cent were from the social sciences. Remove economics from this category and less than 8 per cent of the cited peer-reviewed literature in the Third Assessment Report was from the social sciences. This powerful bias to the natural sciences in the construction of 'IPCC knowledge' about climate change has been remarked on for many years. Even before the Second Assessment Report was published in 1996, Shackley and Skodvin (1995) were critical of the lack of appreciation by the IPCC of the interpretative social sciences, what Howard Newby referred to as the 'IPCC fallacy' (cited in Cohen *et al.*, 1998). Malone and Rayner (2001) repeated this criticism with respect to both the Second and Third Assessment Reports (as has Yearley (2009) with respect to the Fourth Assessment) and offered a number of epistemological, institutional and political reasons why the social science disciplines were marginalised by the IPCC.

Other analysts from more specific perspectives have examined the disciplinary biases in, or profiles of, the knowledge assessed by the IPCC. Caseldine *et al.* (2010), for example, concentrated specifically on how paleoclimate research has been represented in the two decades of IPCC reports, welcoming the greater prominence given to such research in the IPCC Fourth Assessment (AR4). From a different disciplinary standpoint, Nordlund (2008) examined 13,000 cited references in Working Groups 2 and 3 of IPCC AR4 for evidence of work related to the 'futures' community – work either published in core futures journals or by known futures experts. His argument was that for an assessment which is so heavily futures-oriented, the inclusion of futures research in the 2007 Fourth Assessment was depressingly thin; the IPCC would benefit from assessing research from a community which specialises in 'the philosophical and methodological aspects of prediction and forecasting' [p.875].

Hiramatsu *et al.* (2008) followed a different methodology, but reached a similar conclusion. They developed a mapping framework for climate change research content based on the relationships between nature and human society. This framework comprised seven elements: (1) socioeconomic activity and greenhouse gas emissions, (2) carbon cycle

and carbon concentration, (3) climate change and global warming, (4) impacts on ecosystems and human society, (5) adaptation, (6) mitigation, and (7) social systems. Applying the framework to the contents of IPCC AR4 showed that the quantity and reliability of assessed research in elements (2) and (3) had increased relative to the Third Assessment Report. But research evidence addressing elements (1), (5) and (7) was lacking and these were the elements where social sciences and humanities research had most to contribute. Godal (2003) too has criticised the disciplinary biases and rigidities of the IPCC assessment structure (a criticism also voiced by Leemans, 2008). Scrutinising the assessment of knowledge about greenhouse gas emissions indices, Godal points out that the disciplinary silos maintained across the respective IPCC Working Groups restrict the usefulness of the assessment. "The structure of the work within the IPCC seems to be based on ... the understanding that the science of climate change follows a clear-cut 'disciplinary line' – from the natural sciences to the social sciences, where the latter is based on the former" (p.247).

This existence of knowledge hierarchies is of course not unique to the IPCC. These have also been seen at work in other international fora, such as the Copenhagen Climate Change Congress, organised by the University of Copenhagen in March 2009. O'Neill et al. (2010) analysed the 600 research abstracts presented during that week and found evidence of disciplinary, gender and geographical biases in the knowledge being mobilised around climate change. In the wider setting of socio-ecological research, Miller *et al.* (2008) argue in favour of epistemological pluralism when it comes to understanding complex systems that embrace the human and non-human worlds; and climate change is surely one such system. Echoing Jerome Kagan's three cultures – knowledge as mechanistic (predictable physical systems), contingent (complex adaptive systems) and as narrative (socially constructed systems) (Kagan, 2009) – Miller *et al.* seek to subvert conventional hierarchies of knowledge by offering a different hierarchical structure: trans-disciplinary, inter-disciplinary, multi-disciplinary and disciplinary knowledge.

Yet the IPCC remains largely conventional in its hierarchical instincts. In a recent sociological critique of the IPCC, Yearley (2009) argues that climate science is currently constructed through assigning the (interpretative) social sciences a specific role – a subsidiary one. "The institutional assumption of the IPCC is that the most relevant social science is economics" [p.401], thus marginalising knowledge about climate change which

emerges from disciplines such as anthropology, psychology, communication science, philosophy and history. Yearley's assertion is certainly borne out by Bjurström and Polk's (2010) analysis.

The second area where critical analysis of the expertise mobilised in the IPCC assessments has been made is with respect to the participation of developing country experts. Despite increasing attention paid by the IPCC governing bureau to these concerns since they were first expressed in the early 1990s (and continue to be expressed; e.g. Demeritt, 2001; Miller, 2007; Grundmann, 2007; Runci, 2007), the proportion of IPCC authors and reviewers from OECD versus non-OECD has not changed. For each of the Second, Third and Fourth Assessments Reports of the IPCC, the percentage of both authors and reviewers from the OECD nations has remained remarkably constant at between 80 and 82 percent (authors' own assessment). For example, Kandlikar and Sagar (1999) examined the IPCC First and Second Assessment Reports with respect to the participation of Indian expertise and found the participation "heavily skewed in favour of some industrialised countries" (p.134).

The consequences of this 'geography of IPCC expertise' are significant, affecting the construction of IPCC emissions scenarios (Parikh, 1992), the framing and shaping of climate change knowledge (Shackley, 1997; Lahsen, 2007; O'Neill *et al.,* 2010) and the legitimacy of the knowledge assessments themselves (Elzinga, 1996; Weingart, 1999; Lahsen, 2004; Grundmann, 2007; Mayer & Arndt, 2009; Beck, 2010). As Bert Bolin, the then chairmen of the IPCC remarked back in 1991: "Right now, many countries, especially developing countries, simply do not trust assessments in which their scientists and policymakers have not participated. Don't you think credibility demands global representation?" (cited in Schneider, 1991). Subsequent evidence for such suspicions has come from many quarters (e.g. Karlsson *et al.,* 2007) and Kandlikar and Sagar concluded their 1999 study of the North-South knowledge divide by arguing, "... it must be recognised that a fair and effective climate protection regime that requires cooperation with developing countries, will also require their participation in the underlying research, analysis and assessment" (p.137). This critique is also voiced more recently by Myanna Lahsen (2004) in her study of Brazil and the climate change regime: "Brazilian climate scientists reflect some distrust of ... the IPCC, which they describe as dominated by Northern framings of the problems and therefore biased against interpretations and interest of the South" (p.161).

Governance and Learning

Since its foundation in 1988, the IPCC has evolved its own rules of governance and procedure in response to both internal and external events and criticisms. How well it has done so – how well it is an exemplary learning institution – has been the subject of a number of studies. We don't mean 'learning' in the sense of Doherty *et al.* (2009), in which a group of IPCC Working Group 1 lead authors reflected on what changes may be desirable to the specific content of future IPCC reports. We mean learning in the sense of 'organisational social learning' (Siebenhüner, 2008) and in the practices of knowledge assessment.

The formal work of the IPCC is governed by its rules of procedure. These have undergone two major revisions, in 1993 and again in 1999 (IPCC, 1999; Skodvin, 2000b). The 1999 changes introduced review editors, adopted formal rules for the adoption of the IPCC Synthesis Report and made clear the circumstances under which non-peer-reviewed literature would be acceptable. The changes adopted in 1999 were partly in response to controversies around Chapter 8 ('Detection of climate change and attribution of causes') in Working Group 1 of the IPCC Second Assessment (see Lahsen, 1999; Edwards & Schneider, 2001) and partly to accommodate more diverse regional sources of knowledge for the regionally-focused chapters of Working Group 2.

It is these latter 'grey literature' sources which have come under close scrutiny in recent months (Nature, 2010) and which may now – in 2010 and under some duress – lead to further changes in procedure[1]. As Skodvin remarked presciently in 2000: "... using information from non-published sources may compromise the scientific authority the IPCC has gained over the years it has been in operation" (Skodvin, 2000b: 414). Maintaining scientific integrity and quality control, whilst retaining political credibility and salience – the classic twin goals of a science-policy boundary organisation (Guston, 2001) – is not easy.

With regard to wider organisational learning, studies by Siebenhüner (2002, 2003) and Tonn (2007) offer a positive view of how the IPCC has been governed and how it has learned. Siebenhüner (2003) argues that the evolution of the IPCC has led to "a decreasing

[1] In March 2010, the United Nations secretary-general and the chair of the IPCC invited the Inter-Academy Council, a multinational organization of the world's science academies, to conduct an independent review of the IPCC processes and procedures. The review will guide the processes and procedures of the IPCC's fifth assessment report and future assessments of climate science.

influence of national governments on the climate negotiation process through the [knowledge] assessment process" (p.121), claiming this to be a positive achievement. Yet this has perhaps only been achieved at the cost of greater procedural bureaucracy and complexity and hence loss of transparency and accountability (Grundmann, 2007; Beck, 2010). Like Siebenhüner, Tonn (2007) and Dahan-Delmedico (2008) also take a rosy view of the IPCC, Tonn claiming it has been an "amazingly successful transformative initiative" (p.614) and that it should act as a design model for other forms of global knowledge assessment.

Others, however, have taken a more nuanced or critical position. Rothman *et al.* (2009) in their study of a number of different global knowledge assessment processes, including the IPCC, suggest that improvements need to be made: for example improved communication of sources of uncertainty (see section below) and the use and presentation of more qualitative data and knowledge. Demeritt (2001), Miller (2007), Grundmann (2007) and Yearley (2009) also offer more penetrating critiques. Miller's analysis, for example, argues for the need to be vigilant of the ways in which international knowledge institutions like the IPCC gain power and influence in international deliberations and yet are not always open, democratic or accountable in their own modes of operation.

Saloranta (2001) and Yamineva (2010) both approach the question of the governance and operation of the IPCC through the lens of post-normal science (Funtowicz & Ravetz, 1993), yet they reach almost diametrically opposite conclusions. Saloranta argues that the IPCC is an example of how the philosophy of post-normal science is reflected in practice, whereas Yamineva is critical of the Panel's reflexivity: "... the IPCC is clearly not a post-normal science institution in this regard" (Yamineva, 2010: 178). This lack of reflexivity is echoed by Beck (2010) in her study of the appropriateness of the IPCC model of knowledge production for the difficult questions surrounding adaptation policy and decision-making. She offers evidence suggesting that Miller's (2007) anxiety that the IPCC has not earned the political legitimacy it needs to exert constraints on the global exercise of power may be well-founded.

And legitimacy is what has been tested in the recent controversies surrounding various 'errors' in the IPCC Fourth Assessment Report. This has been a test for the leadership and transparency of the IPCC and of its peer-review system. Shackley's perspective on the IPCC from 1997 is again prescient, warning of the "... danger(s) of the

IPCC peer reviewing process becoming too self-contained and insulated from criticism at the paradigm level" (Shackley, 1997: 79). Yearley (2009) has also made similar observations with respect to peer-review and the IPCC, suggesting again that sociology, and the social sciences more generally, has much to offer those responsible for the leadership and management of the IPCC. As Whatmore (2009) has pointed out, knowledge controversies are moments for learning, "... when what we presumed we knew becomes fluid, molten or dislodged". It remains to be seen how the IPCC will learn from this moment and seek to 're-solidify' its knowledge, status and credibility in the eyes of decision-makers and the public. Political credibility continues to trade on scientific credibility, which in turn is grounded as much in trust as in truth (Beck, 2010).

Consensus and Uncertainty

Since its origins, the IPCC has been open and explicit about seeking to generate a 'scientific consensus' around climate change and especially about the role of humans in climate change. Yet this has been a source of both strength and vulnerability for the IPCC. Understanding consensus as a process of 'truth creation' (or the more nuanced 'knowledge production') which marginalises dissenting voices – as has frequently been portrayed by some of the IPCC's critics (see Edwards & Schneider, 2001; Petersen, 2010) – does not do justice to the process.

Consensus-building in fact serves several different goals. As Horst and Irwin (2010) have explained, seeking consensus can be as much about building a community identity – what Haas (1992) refers to as an epistemic community – as it is about seeking the 'truth'. Equally, as Yearley (2009) explains, IPCC consensus-making is an exercise in collective judgement about subjective (or Bayesian) likelihoods in areas of uncertain knowledge. Consensus-making in the IPCC has been largely driven by the desire to communicate climate science coherently to a wide spectrum of policy users – 'to construct knowledge' (Weingart, 1999) - but in so doing communicating uncertainties have been down-played (van der Sluijs, 1998). As Oppenheimer *et al.* (2007: 1506) remark: "The establishment of consensus by the IPCC is no longer as critical to governments as [is] a full exploration of uncertainty."

Without a careful explanation about what it means, this drive for consensus can leave the IPCC vulnerable to outside criticism. Claims such as '2,500 of the world's leading

scientists have reached a consensus that human activities are having a significant influence on the climate' are disingenuous. That particular consensus judgement, as are many others in the IPCC reports, is reached by only a few dozen experts in the specific field of detection and attribution studies; other IPCC authors are experts in other fields. But consensus-making can also lead to criticism for being too conservative, as Hansen (2007) has most visibly argued. Was the IPCC AR4 too conservative in reaching its consensus about future sea-level rise? Many glaciologists and oceanographers think they were (Kerr, 2007; Rahmstorf, 2010), leading to what Hansen attacks as 'scientific reticence'. Solomon *et al.* (2008) offer a robust defence, stating that far from reaching a premature consensus, the AR4 report stated that in fact no consensus could be reached on the magnitude of the possible fast ice-sheet melt processes that some fear could lead to 1 or 2 metres of sea-level rise this century. Hence these processes were not included in the quantitative estimates.

This leads onto the question of how uncertainty more generally has been treated across the various IPCC Working Groups. As Ha-Duong *et al.* (2007) and Swart *et al.* (2009) explain, despite efforts by the IPCC leadership to introduce a consistent methodology for uncertainty communication (Moss & Schneider, 2000; Manning, 2006), it has in fact been impossible to police. Different Working Groups, familiar and comfortable with different epistemic traditions, construct and communicate uncertainty in different ways. This opens up possibilities for confusion and misunderstanding not just for policy-makers and the public, but among the experts within the IPCC itself (Risbey & Kandlikar, 2007).

For Ha-Duong *et al.* (2007) this diversity is an advantage: "The diverse, multi-dimensional approach to uncertainty communication used by IPCC author teams is not only legitimate, but enhances the quality of the assessment by providing information about the nature of the uncertainties" (p.10). This position reflects that of others who have thought hard about how best to construct uncertainty for policy-relevant assessments (Van der Sluijs, 2005; Van der Sluijs et al., 2005). For these authors 'taming the uncertainty monster' requires combining quantitative and qualitative measures of uncertainty in model-based environmental assessment: the so-called NUSAP (Numerical, Unit, Spread, Assessment, Pedigrees) System (Funtowicz & Ravetz, 1990). Webster (2009) agrees with regard to the IPCC: "Treatment of uncertainty will become more important than consensus if the IPCC is to stay relevant to the decisions that face us" (p.39). Yet Webster also argues that such diverse forms of uncertainty assessment will require much more careful explanation about

how different uncertainty metrics are reached; for example the difference between frequentist and Bayesian probabilities and the necessity of expert, and therefore subjective, judgements in any assessment process (see also Hulme, 2009a; Guy & Estrada, 2010).

This suggests that more studies such as Petersen's detailed investigation of the claim about detection and attribution in the IPCC Third Assessment Report (Petersen, 2010; see also 2000 and 2006) are to be welcomed. He examines the crafting of this statement in both scientific and policy contexts, explores the way in which the IPCC mobilised Bayesian beliefs and how outside review comments were either resisted or embraced. While he concludes that the IPCC writing team did a reasonable job of reflecting the state of knowledge in this specific area, he is also critical of the inconsistencies and ambiguities in the ways the IPCC, more broadly, handled and presented uncertainty (cf. Swart *et al.*, 2009). Betz (2009) offers a second example of a detailed case study of how the IPCC constructs its knowledge claims, this time a more theoretical and methodological example. Betz contrasts two methodological principles which may guide the construction of the IPCC climate scenario range: modal inductivism and modal falsificationism. He argues that modal inductivism, the methodology implicitly underlying the IPCC assessments, is severely flawed and advocates a radical overhaul of the IPCC practice to embrace modal falsificationism.

Equally important for the IPCC is how the uncertainties embedded in its knowledge claims are communicated and received more widely. This too is an area where scholars have been at work. Patt (2007) and Budescu *et al.* (2009) approach the question empirically and draw upon psychological theory to examine how different forms of uncertainty communication used by the IPCC – for example uncertainties deriving from model differences versus disagreements between experts – alter the perceived reception of respective knowledge claims. Patt (2007) found that these two framings of uncertainty *did* influence lay perceptions and Budescu *et al.* found respondents interpreted IPCC's quantitative uncertainties in ways rather different from that intended by the Assessments. They both call for the social features of uncertainty to be attended to more carefully in future IPCC assessments and suggest some alternative formulations.

Schenk and Lensink (2007) and Fogel (2005) examine more precise examples of uncertainty communication from IPCC assessments: uncertainty about future emissions of greenhouse gases and uncertainties in national inventories of greenhouse gas emissions. Schenk and Lensink (2007), for example, suggest improved communication of complex

messages from the IPCC through clearer reasoning when communicating with non-scientists, making emissions scenarios explicitly normative and increasing stakeholder participation in scenario development.

Impact and Influence

One thing that nearly all commentators and critics agree on about the IPCC is that it has had a significant influence on climate change knowledge, on public discourse about climate change and on climate policy development. They may disagree about the exact reasons for this influence and whether this influence has always been for the best. We will finish this review article by commenting briefly on research which has examined each of these three areas of IPCC's influence.

The IPCC has helped fashion and consolidate a global climate change epistemic community (Haas, 1992; Elzinga, 1996). Gough and Shackley (2001) remarked on the importance of this function with respect to the status of the IPCC within non-governmental organisations and their mobilisation of science in support of campaigning agendas. The impact and status of this IPCC epistemic community has been examined from a number of different regional perspectives: for Brazil (Lahsen, 2004); for France (Dahan-Dalmedico & Guillemot, 2006); and for China (Mayer & Arndt, 2009). Dahan-Dalmedico and Guillemot (2006) conclude that IPCC knowledge 'travels well', but others have drawn out some of the problems with the circulation of IPCC knowledge (Grundmann, 2007; Hulme, 2008), problems which geographers of science have been pointing out in other spheres (e.g. Powell, 2007; Carolan, 2008). Mayer and Arndt (2009) warn against the 'epistemological hegemony' of the IPCC and sociologist Bruno Latour goes so far as to describe the IPCC as an 'epistemological monster' (cited in Dahan-Dalmedico, 2008). Despite these examples, there remains considerable detailed empirical work to be done around the world on exactly where, how and why the practices of climate change knowledge production developed by the IPCC have altered scientific practice, in the biogeophysical sciences and social sciences, but also in the design of inter-disciplinary work around climate change.

The IPCC has also gained visibility in public spaces as the authoritative voice of climate change knowledge – 'the privileged speaker and discursive leader' (Elzinga, 1996) - a visibility enhanced through being awarded the 2007 Nobel Peace Prize. Researchers have

found various ways to study this influence. Hulme (2009b) dissected how UK print media reported and re-framed key messages from Working Groups 1, 2 and 3 of the IPCC AR4, while Walsh (2009) examined how rhetorical devices used in the Summary for Policymakers of Working Group 1 of AR4 allowed the IPCC to work publicly and visibly across the boundaries between science and policy. The 'boundary work' (Gieryn, 1983) that the IPCC performs is also explored by Gough and Shackley (2001) with regard to legitimising the scientific vocabulary NGOs have been able to deploy in public spaces. Hjerpe and Linnér (2009) examine how visions of future society have been employed in IPCC assessments, finding evidence of utopian thinking. Such visions of future society fall into three categories: projections, dystopian thought, and utopian thought which shape public discourse around climate change.

With regard to the impact of the IPCC on policy development opinions become more polarised. Early on in the IPCC history, Moss (1995) laid out claims for the IPCC being policy relevant (i.e., neutral), but not policy driven (i.e., partisan), but even in the 1990s such claims of policy neutrality were challenged (e.g. Boehmer-Christiansen, 1994a). Miller (2001) examined whether the management of this science-policy boundary has been effectively secured by the body established by the UN Framework Convention on Climate Change to do just that: the Subsidiary Body for Science and Technology Assessment (SBSTA). Miller suggests that SBSTA constructs boundaries and confers legitimacy, enabling the "maintenance of a productive tension between science and politics" (p.495). This optimistic reading of SBSTA is echoed by Dahan-Delmedico (2008) who claims that the IPCC has thereby been able to deflect a certain category of criticism for being too close to policy advocacy.

This is not a conclusion shared by others. In his analysis of the knowledge politics of climate change, Grundmann (2007) concludes that using science to provide "the basis for the legitimation of political decisions is a tried and tested instrument" (p.428) and that the IPCC fits this pattern very well. Pielke (2007) and Sarewitz (2010) agree that the IPCC has failed in its role as an 'honest-broker' and has moved towards being an 'issue advocate' in Pielke's terminology, or even on some occasions a 'stealth issue advocate'. Drawing upon insights from science and technology studies and citing wider examples of science controversies, Carolan (2008) explains some of the reasons why this may have been the case with the IPCC. None of this has stopped some researchers from holding up the IPCC as a

role model for knowledge assessments that other areas of global environmental policy concern could emulate (e.g. Dahan-Dalmedico & Guillemot, 2006; Tonn, 2007).

Conclusion

During its 20-year history, the IPCC has been examined critically from a number of different standpoints: dissecting its 1980s origins; revealing its norms, practices and modes of self-governance; debating the role of consensus in its assessments; policing characterizations of uncertainty; and tracing the relationship of its institutional function and knowledge claims to emerging ideas of global environmental governance. But other questions about the status of climate change knowledge synthesized by the IPCC remain less widely investigated, questions which emerge from the agendas raised by the new geographers of science (e.g. Powell, 2007; Finnegan, 2008). As Sheila Jasanoff has shown in many of her writings (e.g. Jasanoff, 2004a,b; 2010), knowledge that is claimed by its producers to have universal authority is received and interpreted very differently in different political and cultural settings. Revealing the local and situated characteristics of climate change knowledge thus becomes central for understanding both the acceptance and resistance that is shown towards the knowledge claims of the IPCC. It is a task for physical and human geographers to take seriously, and to do together.

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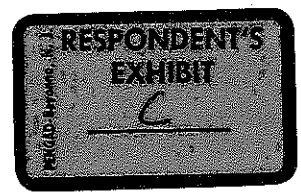

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The appliance of science

Politicians and the public look to scientists to explain the causes of climate change and whether it can be tackled - and they are queuing up to deliver. But, asks Mike Hulme, are we being given the whole picture?

Mike Hulme
The Guardian, Wednesday 14 March 2007

A larger | smaller

Climate change is happening, but it appears that science is split on what to do about it. One of the central reasons why there is disagreement about how to tackle climate change is because we have different conceptions of what science is, and with what authority it speaks - in other words, how scientific "knowledge" interacts with those other realms of understanding brought to us by politics, ethics and spirituality.

Two scientists - one a climate physicist, the other a biologist - have written a book arguing that the warming currently observed around the world is a function of a 1,500-year "unstoppable" cycle in solar energy. The central thesis is linked to evidence that most people would recognise as being generated by science. But is this book really about science?

It is written as a scientific text, with citations to peer-reviewed articles, deference to numbers, and adoption of technical terms. A precis of the argument put forward in the book by Fred Singer, an outspoken critic of the idea that humans are warming the planet, and Dennis Avery is that a well-established, 1,500-year cycle in the Earth's climate can explain most of the global warming observed in the last 100 years (0.7C), that this cycle is in some way linked to fluctuations in solar energy, and because there is nothing humans can do to affect the sun we should simply figure out how to live with this cycle. We are currently on the upswing, they say, warming out of the Little Ice Age, but in a few hundred years will be back on the downswing. Efforts to slow down the current warming by reducing emissions of greenhouse gases are at best irrelevant, or at worst damaging for our future development and welfare.

This, of course, is not what the fourth assessment report of the UN Intergovernmental Panel on Climate Change (IPCC) said a few weeks ago. The report from its climate science working group concluded that it is likely that most of the warming of the last 50 years has been caused by rising greenhouse gas concentrations and that, depending on our actions now to slow the growth of emissions, warming by 2100 will probably be between about 1.5C and 6C.

The upper end of this range is almost an order of magnitude larger than the warming that Singer and Avery suggest is caused by the 1,500-year cycle. So is this a fight between scientific truth and error? This seems to be how Singer and Avery would like to present it - "science is the process of developing theories and testing them against observations until they are proven true or false".

Means of inquiry

At one level, it is as simple as this. Science as a means of inquiry into how the world works has been so successful because it has developed a series of principles, methods and techniques for being able to make such judgments. For example, we now understand the major transmission routes for HIV/Aids, that smoking injures health, and that wearing seat belts saves lives.

And so it is with climate change. Increasing the concentration of greenhouse gases in the atmosphere warms the planet and sets in motion changes to the way the weather is delivered to us, wherever we are. Science has worked hard over a hundred years to establish this knowledge. And new books such as Singer and Avery's, or opinion pieces in the Daily Mail, do not alter it.

So far so good. Deploying the machinery of scientific method allows us to filter out hypotheses - such as those presented by Singer and Avery - as being plain wrong. But there are two other characteristics of science that are also important when it comes to deploying its knowledge for the benefit of public policy and society: that scientific knowledge is always provisional knowledge, and that it can be modified through its interaction with society.

That science is an unfolding process of discovery is fairly self-evident. The more we seem to know, the more questions we seem to need answering. Some avenues of scientific inquiry may close off, but many new ones open up. We know a lot more about climate change now than 17 years ago when the first IPCC scientific assessment was published. And no doubt in another 17 years our knowledge of how the climate system works and the impact that humans have made on it will be significantly different to today.

Yet it is important that on big questions such as climate change scientists make an assessment of what they know at key moments when policy or other collective decisions need to be made. Today is such a time.

But our portrayal of the risks of climate change will always be provisional, subject to change as our understanding advances. Having challenges to this unfolding process of discovery is essential for science to thrive, as long as those challenges play by the methodological rule book that science has painstakingly written over many generations of experience.

The other important characteristic of scientific knowledge - its openness to change as it rubs up against society - is rather harder to handle. Philosophers and practitioners of science have identified this particular mode of scientific activity as one that occurs where the stakes are high, uncertainties large and decisions urgent, and where values are embedded in the way science is done and spoken.

It has been labelled "post-normal" science. Climate change seems to fall in this category. Disputes in post-normal science focus as often on the process of science - who gets funded, who evaluates quality, who has the ear of policy - as on the facts of science.

So this book from Singer and Avery can be understood in a different way: as a challenge to the process of climate change science, or to the values they believe to be implicit in the science, rather than as a direct challenge to scientific knowledge.

In this reading, Singer and Avery are using apparently scientific arguments - about 1,500 year cycles, about the loss of species, about sea-level rise - to further their deeper (yet unexpressed) values and beliefs. Too often with climate change, genuine and necessary debates about these wider social values - do we have confidence in

technology; do we believe in collective action over private enterprise; do we believe we carry obligations to people invisible to us in geography and time? - masquerade as disputes about scientific truth and error.

We need this perspective of post-normal science if we are going to make sense of books such as Singer and Avery's. Or indeed, if we are to make sense of polar opposites such as James Lovelock's recent contribution The Revenge of Gaia, in which he extends climate science to reach the conclusion that the collapse of civilisation is no more than a couple of generations away.

The danger of a "normal" reading of science is that it assumes science can first find truth, then speak truth to power, and that truth-based policy will then follow. Singer has this view of science, as do some of his more outspoken campaigning critics such as Mark Lynas. That is why their exchanges often reduce to ones about scientific truth rather than about values, perspectives and political preferences. If the battle of science is won, then the war of values will be won.

If only climate change were such a phenomenon and if only science held such an ascendancy over our personal, social and political life and decisions. In fact, in order to make progress about how we manage climate change we have to take science off centre stage.

This is not a comfortable thing to say - either to those scientists who still hold an uncritical view of their privileged enterprise and who relish the status society affords them, or to politicians whose instinct is so often to hide behind the experts when confronted by difficult and genuine policy alternatives.

Two years ago, Tony Blair announced the large, government-backed international climate change conference in Exeter by asking for the conference scientists to "identify what level of greenhouse gases in the atmosphere is self-evidently too much".

This is the wrong question to ask of science. Self-evidently dangerous climate change will not emerge from a normal scientific process of truth seeking, although science will gain some insights into the question if it recognises the socially contingent dimensions of a post-normal science. But to proffer such insights, scientists - and politicians - must trade (normal) truth for influence. If scientists want to remain listened to, to bear influence on policy, they must recognise the social limits of their truth seeking and reveal fully the values and beliefs they bring to their scientific activity.

Chink of weakness

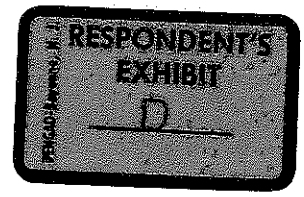
Lack of such reflective transparency is the problem with "unstoppable global warming", and with some other scientific commentators on climate change. Such a perspective also opens a chink of weakness in the authority of the latest IPCC science findings.

What matters about climate change is not whether we can predict the future with some desired level of certainty and accuracy; it is whether we have sufficient foresight, supported by wisdom, to allow our perspective about the future, and our responsibility for it, to be altered. All of us alive today have a stake in the future, and so we should all play a role in generating sufficient, inclusive and imposing knowledge about the future. Climate change is too important to be left to scientists - least of all the normal ones.

· Mike Hulme, a professor in the school of environmental sciences at the University of East Anglia and the founding director of the Tyndall Centre for Climate Change Research, is writing a book, entitled Why We Disagree About Climate Change

• Unstoppable Global Warming - Every 1,500 Years, by S Fred Singer and Dennis T Avery, is published by Rowman & Littlefield (£21.72). The Guardian and Observer Climate Change Summit will take place in June 2007. For more details visit guardian.co.uk/climatesummit

• Email your comments to society@guardian.co.uk. If you are writing a comment for publication, please mark clearly "for publication"



To: Bob Marshall <DelBMarshall@house.virginia.gov>
From: "Wood, Carolyn (csw8a)" <csw8a@eservices.virginia.edu>
Date: 12/17/2009 01:24PM
cc: Chief of Staff <ChiefofStaff@eservices.virginia.edu>, "Casteen, John (jtc)" <jtc@eservices.virginia.edu>, "Meek, Barry (btm2b)" <btm2b@eservices.virginia.edu>, "Wilkerson, Elizabeth (epw3m)" <epw3m@eservices.virginia.edu>
Subject: Re: FOIA Request

Delegate Marshall - I am responding to your FOIA request of Dec. 14, 2009 for e-mails sent by Michael Mann, a former University of Virginia professor, from 1999 through 2005.

The University does not have any e-mail data for Mr. Mann. When Mr. Mann moved to Penn State his U.Va. account was terminated and all data was later deleted. E-mail data from terminated accounts are routinely deleted after we are assured of a smooth transition to a new institution.

Please know that we had engineers in our department of information technology double-check the status of Mr. Mann's e-mail account.

With regards,
Carol Wood
assistant vice president for Public Affairs
University of Virginia

On 12/14/09 5:23 PM, "Casteen, John (jtc)" <jtc@eservices.virginia.edu> wrote:

Delegate Marshall:

By copy, I am asking Carol Wood, who handles FOIA requests for us, to respond right away to you. She will know how to find correspondence that remains on our servers, and she will be able to determine any cost that may be associated with a search.

Best wishes,
John

From: Bob Marshall [mailto:DelBMarshall@house.virginia.gov]
Sent: Monday, December 14, 2009 4:35 PM
To: Casteen, John (jtc)
Subject: FOIA Request
Importance: High

Dear President Casteen:

I would like to request under the applicable Freedom of Information Act, copies of all e-mails sent by Professor Michael Mann from 1999 through 2005 on his official University of Virginia e-mail. I would like these in an electronic format.

Please advise me if there will be any cost associated with this request. Please send the e-mails to me at this address (delbmarshall@house.virginia.gov).

If you have any questions please contact me on my cell phone at (703) 853-4213.

Sincerely,

Delegate Bob Marshall

RGM/ccg

COMMONWEALTH of VIRGINIA

Office of the Attorney General

Kenneth T. Cuccinelli, II
Attorney General

900 East Main Street
Richmond, Virginia 23219
804-786-2071
FAX 804-786-1991
Virginia Relay Services
800-828-1120
7-1-1

May 6, 2010

Barry T. Meek
Associate General Counsel
University of Virginia
Madison Hall
P.O. Box 400225
Charlottesville, VA 22904-4225

RE: Civil Investigative Demand No. 1-MM and
Civil Investigative Demand No. 2-MM

Dear Barry:

Please allow this letter to confirm the understanding we have reached regarding the above-referenced CIDs.

As we have discussed, this Office agrees to the University's request for an extension of time to respond to the CIDs. Specifically, the University's substantive responses are now due on July 26, 2010, the date requested in your letter of April 27, 2010.

However, the extension does not apply to any objection to the CIDs that the University may wish to raise. To the extent that the University wishes to challenge some aspect of the CIDs, it must still do so in the time prescribed in Va. Code § 8.01-216.18(B)(i).

To date, the only issue raised by the University is the breadth of Category 8 in the "Documents to be Produced" section. Consistent with your request, this Office has agreed to limit Category 8 in the following ways:

(1) Regarding non-electronically archived correspondence, the request only applies to the following Departments, Schools, Programs or persons:

a. Computer Engineering,
b. Computer Science,
c. Engineering and Applied Science,
d. Engineering Physics,
e. Engineering Science,
f. Environmental Engineering,
g. Environmental Sciences,
h. Environmental Thought and Practice,
i. Interdisciplinary Computer Science,
j. Public Policy Program,
k. Science, Technology and Society,
l. Statistics,
m. Administration,
n. IT Department, and
o. Any person who assisted Dr. Mann regarding any of the Grants as defined in the CIDs.

(2) Regarding electronically archived correspondence (primarily e-mail), the request applies to any and all central repositories/e-mail servers. However, to the extent that a Department, School, or Program has its own server or archive system, only the following Departments, Schools, and Programs need be searched:

a. Computer Engineering,
b. Computer Science,
c. Engineering and Applied Science,
d. Engineering Physics,
e. Engineering Science,
f. Environmental Engineering,
g. Environmental Sciences,
h. Environmental Thought and Practice,
i. Interdisciplinary Computer Science,
j. Public Policy Program,
k. Science, Technology and Society,
l. Statistics,
m. Administration,
n. IT Department.

If this letter in any way misstates your understanding of our agreement, please do not hesitate to let me know. Further, if any other issues arise during the collection of the requested information/documents, please contact me to discuss potential resolution of the issues.

Thank you for your attention to this matter.

Very truly yours,

Wesley G. Russell, Jr.
Deputy Attorney General

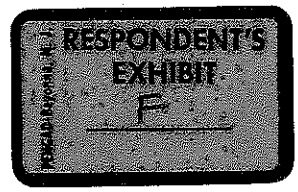
SB 445 Fraud Against Taxpayers Act; created.

another bill? go

Martin E. Williams | all patrons ... notes | add to my profiles

Summary as passed: (all summaries)

Virginia Fraud Against Taxpayers Act; civil penalty. Establishes a cause of action for false claims for payments or reimbursements against the Commonwealth. The remedy includes a civil penalty of between $5,000 and $10,000 plus three times the amount of damages sustained by the Commonwealth. The Attorney General or a private citizen has standing to prosecute the case in the name of the Commonwealth.



Full text:

01/09/02 Senate: Presented & ordered printed, prefiled 01/09/02 025878568 **pdf**
02/11/02 Senate: Committee substitute printed 024729568-S1 **pdf**
03/12/02 Senate: Bill text as passed Senate and House (SB445ER) **pdf | impact statement**
04/17/02 Senate: Reenrolled bill text (SB445ER2) **pdf**
04/18/02 Governor: Acts of Assembly Chapter text (CHAP0842) **pdf**

Amendments:

House amendments
House amendments engrossed
Governor's recommendation

Status:

01/09/02 Senate: Presented & ordered printed, prefiled 01/09/02 025878568
01/09/02 Senate: Referred to Committee for Courts of Justice
02/10/02 Senate: Reported from Courts of Justice w/sub (15-Y 0-N)
02/11/02 Senate: Committee substitute printed 024729568-S1
02/11/02 Senate: Constitutional reading dispensed (40-Y 0-N)
02/11/02 Senate: VOTE: CONST. RDG. DISPENSED R (40-Y 0-N)
02/12/02 Senate: Read second time
02/12/02 Senate: Reading of substitute waived
02/12/02 Senate: Committee substitute agreed to 024729568-S1
02/12/02 Senate: Engrossed by Senate - committee substitute 024729568-S1
02/12/02 Senate: Engrossment reconsidered by Senate (40-Y 0-N)
02/12/02 Senate: VOTE: RECONSIDER R (40-Y 0-N)
02/12/02 Senate: Reengrossed by Senate - committee sub. 024729568-S1
02/12/02 Senate: Constitutional reading dispensed (40-Y 0-N)
02/12/02 Senate: VOTE: CONST. RDG. DISPENSED R (40-Y 0-N)
02/12/02 Senate: Passed Senate (40-Y 0-N)
02/12/02 Senate: VOTE: PASSAGE R (40-Y 0-N)
02/12/02 Senate: Communicated to House
02/18/02 House: Placed on Calendar
02/18/02 House: Read first time
02/18/02 House: Referred to Committee for Courts of Justice
02/22/02 House: Reported from C. J. with amendments (22-Y 0-N)
02/26/02 House: Read second time
02/27/02 House: Read third time
02/27/02 House: Committee amendments agreed to
02/27/02 House: Engrossed by House as amended
02/27/02 House: Passed House with amendments BLOCK VOTE (99-Y 0-N)
02/27/02 House: VOTE: BLOCK VOTE PASSAGE (99-Y 0-N)
03/01/02 Senate: House amendments agreed to by Senate (40-Y 0-N)
03/01/02 Senate: VOTE: CONCUR HOUSE AMENDMENT (40-Y 0-N)
03/12/02 Senate: Bill text as passed Senate and House (SB445ER)
03/18/02 Senate: Enrolled
03/18/02 House: Signed by Speaker
03/19/02 Senate: Signed by President
04/08/02 Senate: Governor's recommendation received by Senate

04/17/02 Senate: Placed on Calendar
04/17/02 Senate: Senate concurred in Gov's recommendation (39-Y 0-N)
04/17/02 Senate: VOTE: ADOPT GOV. RECOMM. (39-Y 0-N)
04/17/02 House: House concurred in Gov's recommendation (99-Y 0-N)
04/17/02 House: VOTE: ADOPTION (99-Y 0-N)
04/17/02 Governor: Governor's recommendation adopted
04/17/02 Senate: Reenrolled
04/17/02 Senate: Reenrolled bill text (SB445ER2)
04/17/02 Senate: Signed by President as reenrolled
04/17/02 House: Signed by Speaker as reenrolled
04/17/02 House: Enacted, Chapter 842 (effective 1/1/03)
04/18/02 Governor: Acts of Assembly Chapter text (CHAP0842)